TY B Tech (Electronics Engineering) – I

Subject : Digital Signal Processing

Question Bank

SECTION I

Q2 Short Questions (4 marks)

1. State and prove circular time reversal property of DFT of a DT signal.
2. Given x(n) Determine $x((-n))_4$, $x((n-2))_4$, $x((n+1))_4$
3. Compute 4 point DFT of the given sequence x (n) .
4. Compute IDFT of given DFT sequence X(k)
5. Draw a direct form realization for the given linear phase FIR filters. (Given Impulse response / transfer function/ difference equation)
6. Compute 4 point circular convolution of sequences x(n) and h(n)
7. Draw a direct form / cascade realization structure for given FIR system. (Given Impulse response / transfer function/ difference equation)
8. Explain DFT as linear transformation along with cyclic property of twiddle factor.
9. State and prove circular time shifting property of DFT of a DT signal.
10. State and explain properties of ROC of z transform
11. Draw and explain the block diagram of real time DSP system.
12. What do you understand by each of the following:

    a. Nyquist frequency c. Nyquist rate

    a. b. Sampling Rate d. Sampling frequency
13. Explain the relation between DFT & Z transform.
14. Explain the symmetry properties of DFT.
15. Derive the expression for circular convolution.
16. List different properties of z transform.
17. How to obtain the causality and stability from the system transfer function? Explain with Example.
18. Explain the property of convolution and correlation of Z transform.
19. Obtain the system function for the LTI system described by constant coefficient difference equation. Also obtain the transfer function for all zero system and all pole system.
20. Why an all zero system is called as FIR system and all pole system is called as IIR system? Explain.
21. Explain how circular convolution can be computed by using DFT/ IDFT.

Q3 Long questions **(6 Marks)**

1. List out the similarities and differences between DIT and DIF algorithms. Find DFT of the given x(n) using DIT algorithm.
2. List out the similarities and differences between DIT and DIF algorithms. Find DFT of the given x(n) using DIF algorithm.
3. Obtain Direct form I, Direct form II realizations for the given system (Given transfer function/ difference equation)
4. Obtain cascade and parallel realizations for the given system (Given transfer function/ difference equation)
5. Obtain the output of a filter using overlap & add method whose input & impulse response are given.
6. Obtain the output of a filter using overlap save method whose input & impulse response is given.
7. Differentiate between overlap add and overlap save method. Explain the general method of signal segmentation estimation using overlap add method.
8. Develop a DIF FFT algorithm .Hence determine X(k) of the given sequence using DIF FFT algorithm .
9. Develop a DIT FFT algorithm .Hence determine X(k) of the given sequence using DIT FFT algorithm .
10. Discuss in detail the divide and conquer approach to compute the DFT.
11. Explain how N point DFT can be calculated using N/2 point DFTs using Decimation in Time with necessary equations.
12. Explain how N point DFT can be calculated using N/2 point DFTs using Decimation in Frequency with necessary equations.
13. Draw the signal flow graph for 8 point DIT FFT algorithm. Calculate the computational complexity.
14. Explain in brief how DFT can be used for linear filtering.
15. Compute circular convolution between given two sequences using DFT/IDFT method.

SECTION II

Q4 Short Questions **(4 marks)**

1. Describe the applications of DSP in various fields.
2. Explain in Multiply & Accumulate (MAC) unit of digital signal processor
3. Draw and explain the barrel shifter block of DSP chip.
4. Explain in brief windowing. Compare different window characteristics based on transition width and stop band attenuation.
5. Given system function of analog filter convert to digital filter whose system function using bilinear transformation.
6. Given system function of analog filter convert to digital filter whose system function using impulse invariant method.
7. Given the desired specifications Ωp, Ωs, $\delta 1, \delta 2$ of Butterworth filter derive the relation for obtaining order N & cutoff frequency Ωc.
8. Design the first order low pass filter with fc = 1 kHz and sampling frequency fs = 8000 sps. Use bilinear transformation method.
9. Design the first order low pass filter with fc = 1 kHz and sampling frequency fs = 8000 sps. Use impulse invariant method.
10. Explain the Windowing technique for FIR filter design along with different window functions.
11. Draw and explain the architecture of TMS 320C54 DSP.
12. Explain in brief windowing. Compare different window characteristics based on transition width and stop band attenuation.
13. Write the analog transfer function for Butterworth filter of order 2 & cutoff frequency $\Omega c = 1$.
    i. Using frequency transformations convert above filter to
        i. Low pass filter with cutoff frequency $\Omega c' = 0.5$
        ii. High pass filter with cutoff frequency $\Omega c' = 1.00$
14. Describe the applications of DSP in Image processing.
15. Draw and explain the structure for 4 x 4 Baron Multiplier for unsigned numbers.
16. Explain in brief the special addressing modes provided in the architecture of DSP.
17. Give the transfer function of Butterworth LPF of order N. Explain in brief how to compute order and cutoff frequency of the filter from the desired specifications of filter.
18. Draw and explain the barrel shifter block of DSP chip. .
19. Explain the frequency sampling method for design of FIR filters.
20. Design the first order High pass filter with fc = 1.5 kHz and sampling frequency fs = 10 KHz. Use bilinear transformation method.
21. Explain in brief the special addressing modes provided in the architecture of DSP
22. Explain in brief windowing. Give mathematical expression for different windows. Compare different window characteristics based on transition width and stop band attenuation.

Q5 Long Questions **(6 marks)**

1. Design a digital Butterworth filter to meet given constraints using bilinear transformation.
2. Design a digital Butterworth filter to meet given constraints using Impulse Invariant Technique.
3. Explain finite word length effect in designing FIR filters.
4. Explain Impulse Invariant method for designing IIR filters in detail. State its limitations.
5. Explain in detail bilinear transformation for designing IIR filters.
6. Explain the applications of DSP in Image Processing and Biomedical field.
7. Given desired frequency response of a low pass filter determine hd(n) . Also determine h(n) using given window with window length 5.
8. Given desired frequency response of a high pass filter determine hd(n) . Also determine h(n) using given window with window length 5.
9. Derive the relation for mapping between s domain & z domain for bilinear transformation.
10. Explain finite word length effect in designing IIR filters.

TY B Tech (Electronics Engineering) – II

Subject: VLSI Design

Question Bank

Section I

1. Explain in brief the concurrent statement in VHDL
2. Explain with suitable example different forms of wait statement. What is the significance of wait for 0 ns?
3. What do you mean by VHDL attribute? Write the classes of predefined attributes.
4. Explain following attributes of VHDL with suitable example of using these attributes
   1. T'HIGH 2. T'LOW 3. S'Delayed(T)
   4. S'Active 5.S'Event 6. A' range(N)
   7. A' Left 8. S' Last_value
5. Explain the transport and inertial delays in VHDL
6. Explain in brief different shift operators in VHDL
7. Given VHDL code write the simulation table .
8. Explain the difference between signal and a variable. Give the syntax for declaring these
9. What is a test bench? What are the different types of test benches? Explain in brief.
10. What are the subprograms in VHDL? Explain use of function and procedures in VHDL with suitable example
11. With A= "1111", B= "1001" and C ="1011", evaluate the result of following operations?
    i. (A & C) and (A & B) ii. A rol 2
12. Given VHDL code to determine the corresponding Hardware.
13. With the waveform B given, draw the timing diagram illustrating A and C if the following concurrent statements are executed.
    A <= transport B after 5 ns;
    C <= B after 4 ns;
14. Write VHDL code (Structural Architecture)
    a. 5:32 decoder using 3:8 decoder as a component.
    b. 8:1 mux using 4:1 as a component
    c. Parallel Adder
15. Write VHDL code (Dataflow Architecture/Behavioral Architecture)
    a. 2:4 decoder
    b. 3 input XOR operation
    c. Full adder

d. 4:1 multiplexer
e. Half Adder
f. 3:8 decoder
g. 4:2 priority encoder

16. Write VHDL code for
    a. D / JK / T Flip flop with synchronous reset
    b. D /JK/T Flip flop with asynchronous reset
    c. up/down counters
    d. Shift Registers
    e. Finite State Machines
17. Write VHDL test bench for testing
    a. Half adder
    b. 2:4 decoder
    c. Multiplexer
    d. Counter
    e. Full adder

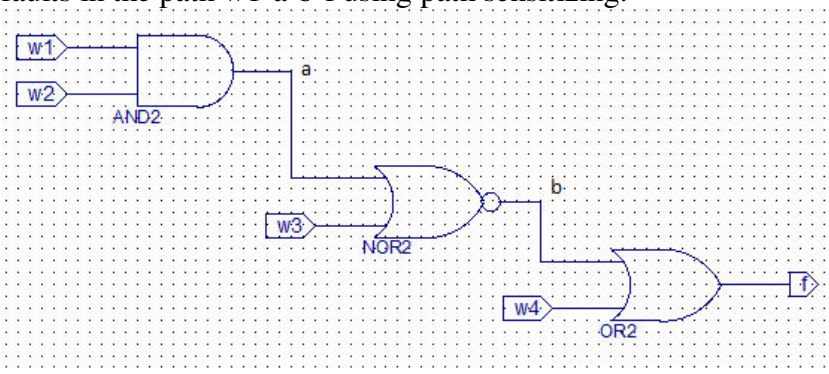
Section II

1. Draw and Explain Xilinx 9500 series CPLD architecture.
2. Draw and explain the architecture of product term allocator and macrocell for XC 9500 CPLD. What maximum number of product terms can be combined and steered to one macrocell ?
3. Note on: Differences between CPLD and FPGA
4. Explain with diagram the input-output block (IO B) of XILINX CPLD 9500.
5. Explain in detail the architecture of function block (FB) of CPLD XILINX 9500.
6. Explain the architecture of macrocell in Xilinx 9500 series CPLD.
7. Draw neat block diagram of 9500 I/O block and explain the analog controls provided
8. Write short note on CLBs in FPGA.
9. Draw internal architecture of XC 4000 configurable logic block and explain.
10. What do you mean by synthesis? What are the inputs and outputs of synthesis? What are the constraints involved?
11. Explain the difference between functional simulation and timing simulation.
12. Explain place and route process of EDA tools.
13. Draw RTL simulation flow and explain the steps in simulation.
14. Explain in brief functional gate level verification.
15. Describe the simulation steps in RTL simulation.
16. Explain synthesis process in brief.
17. Explain CMOS noise margin in detail.

18. What is the Transmission Gate? Explain. Write its advantages.
19. Explain the operation of CMOS inverter along with the transfer characteristics. Explain the behavior of n device and p device in different regions of operation.
20. Explain the effect of changing βn/βp ratio on the transfer characteristic of CMOS inverter.
21. What is noise margin? How to determine noise margin from the transfer characteristics of CMOS inverter?
22. Discuss following for CMOS circuits
    i. Static power dissipation II. Dynamic power dissipation
23. Explain the different regions of operation of CMOS inverter along with equations.
24. Design following gates (with 2 inputs) using CMOS logic
    i. NAND b. OR c. NOR d. AND
25. Derive a CMOS complex gate for give logic functions
26. Design 2:1 multiplexer using Complementary switch.
27. What is a transmission gate? Explain the nMOS and pMOS transistor operation in transmission gate.
28. Give the relation voltages for p and n devices in

I. cutoff II. Saturation and III. Linear (non saturation) regions of operation of a CMOS inverter

29. Draw and explain DC characteristics of CMOS Inverter.
30. Given a Pull up Network of CMOS circuit draw the pull down network.
31. Draw and explain the schematic arrangement for testing sequential circuits.
32. What is the need of testing the circuit? Draw and explain scan path technique.
33. Explain Path Sensitizing method of deriving the test set for the circuit using suitable example.
34. Explain in brief random test method.
35. Explain Built In Self-Test of Testing.
36. Draw and explain pseudorandom binary sequence generator (PRBSG) .
37. Explain SIC and MIC circuits used to compress the result of a test.
38. Determine the minimal test for testing the given circuit using Path sensitizing method.
39. Derive a table showing test vector and the stuck at faults it can detect from a given circuit. Also determine minimal test set for the circuit.
40. What is path sensitizing technique? Determine the test vectors to determine all the faults in the path w1-a-b-f using path sensitizing.



Fourth Y. B. Tech (E& TC) Sem – I (w.e.f. June 2021)

Data Communication

Section I

Q 2. Solve the following (4 Marks each)

1.	Discuss the Need of Computer Network.
2.	Draw OSI Layered model. Which layers are present at Routers in computer Network.
3.	Compare LAN and WAN.
4.	Draw TCP/IP model and list the Protocols at IP Layer.
5.	Explain the functionality of networking device Switch.
6.	Explain the functionality of networking device Router
7.	Why we need framing? List different framing techniques
8.	Discuss HDLC framing technique in detail.
9.	What do you mean by network topology? Discuss star and Ring topology with its advantages and disadvantages.
10.	How error control is done using forward error control approach? Discuss one method with example.
11.	How error control is done using reverse error control approach? Discuss one method with example.
12.	What is the need of Medium access Control?
13.	Why we require framing? Explain any one technique for framing of data.
14.	Explain Sliding window protocol.
15.	Draw and Explain Mode transition diagram for HDLC station.

16.	What is the difference between Pure Aloha and Slotted Aloha
17.	What is the advantage of piggybacking of the acknowledgement?
18.	How Hamming code can be used for Burst error control?
19.	Discuss stop and wait protocol for flow control.
20.	With suitable example explain block parity check technique for error control
21.	Differentiate between circuit switching and packet switching.
22.	Enlist the features of Bluetooth 5.1.
23.	What are the different types of stations in HDLC
24.	Discuss HDLC information frame format and explain.
25.	What is the need of Gateways in computer Network?

Q 3. Solve the following (6 Marks each)

1. **1**	With the help of frame format explain in detail IEEE 802.3 Ethernet Lan standard.
2.	With the help of frame format explain in detail IEEE 802.5
3.	Explain in detail 1-Pesistant CSMA 0-Persistant CSMA P-Persistent CSM Is it possible to have collision of frames in CSMA? If yes, explain how?
4.	With suitable example explain how hamming code can detect and correct single bit error.
5.	With suitable example explain how CRC is used for error control.
6.	Differentiate between circuit switching and Packet switching.
7.	Discuss different framing techniques in detail.
8.	Draw OSI Layer model and discuss the function of each layer.
9.	Draw different network topologies and list advantages and drawbacks of each.
10.	Explain the following types of Networks LAN

	MAN WAN Give on example of each type of network
11.	Discuss different Access control Protocols.
12.	How CRC is used for Error control. A bit stream 1100011011 is transmitted using the standard CRC method. The generator polynomial is x^4+x+1. What is the actual bit string transmitted?
13.	Why flow control is required? How sliding window flow control protocol works?
14.	Discuss STP Protocol in details.
15.	List and explain functions of various layers in OSI Layered model.

Section II

Q 4. Solve the following (4 Marks each)

1.	Discuss count to infinity problem in Link state routing.
2.	Differentiate Virtual circuit & datagram approach
3.	State optimality principle in routing and explain it with suitable example.
4.	Draw the header formats for ARP RARP ICMP
5.	Discuss (TCP) - three-way handshake
6.	What is the use of subnet mask?
7.	List features of IPV6 addressing
8.	What is the need of TELNET Protocol?
9.	How congestion control is done in TCP?

10.	What is the use of subnet Mask? What is subnet mask for class C IP address?
11.	What is difference between ARP and RARP protocols?
12.	Draw and explain UDP header fields.
13.	What is the role played by DNS server in computer Network?
14.	How flow-based routing algorithm works?
15.	How ping command uses ICMP massages?
16.	Explain Classful IP address representation.
17.	Discuss the working of "tracert" networking command.
18.	Explain HTTP header format.
19.	How FTP protocol can be used for sharing files over the network.
20.	What is advantage of classless addressing
21.	List and explain different ICMP Error messages.

Q 5. Solve the following (6 Marks each)

1.	Discuss shortest path routing algorithm with suitable example.
2.	With suitable example, explain distance vector routing algorithm
3.	Draw the header format and discuss the significance of various fields of IP protocol.
4.	Draw IPV4 header format and discuss the fields related to fragmentation and reassembly.
5.	Draw the header format and discuss the significance of various fields of TCP protocol.
6.	Draw the header format and discuss the significance of various fields of ICMP protocol.
7.	With suitable example, explain link state routing algorithm
8.	Discuss different types of ICMP messages.
9.	What is subnetting and supernetting?
10.	How DHCP Protocol works? Explain in detail.
11.	Discuss different classes of IP Address in classful IP representation
12.	Explain FTP Protocol in detail.

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Final Year B. Tech. (Electronics) Sem-II
Audio Video Systems
Question Bank

Unit 1: Fundamentals of Audio System

1. Define amplitude, frequency, phase, and wavelength for a sound wave. Derive the relationship between velocity, frequency and wavelength.
2. Discuss the terms acoustics, reverberation, absorption coefficient, growth and decay of sound.
3. How sound is optically recorded on photographic film using variable density method?
4. Illustrate with neat diagram optical sound recording.
5. Write down step by step procedure for producing records.
6. With a neat block diagram describe the principle of Disc recording.
7. If the gapwidth is 6 microns and the speed of tape is 4.75cm/s, calculate the maximum frequency of recording. What will happen if the tape speed is increased to 19cm/s? Comment for video frequencies.
8. If the velocity of sound at 0 degree Celsius is 332m/s, calculate (a) Velocity at 40^{o}C (b) wavelength for sound of 200Hz at 30^{o}C and 0^{o}C.
9. List out the principle factors related to auditorium design in detail.
10. Explain how energy contained in a sound wave are related to the frequency. Explain that a bandwidth of less than 4 KHz is sufficient for telephone.

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Question Bank

Unit 2: Fundamentals of Television System

1. Define the terms, Kell Factor, Aspect Ratio, Chrominance and Flicker.
2. Elaborate the terms Horizontal & Vertical Resolution in TV.
3. Give the comparison between Interlace scanning & Progressive scanning in detail.
4. Discuss with a neat block diagram generalized colour TV receiver.
5. Discuss why is FM preferred to AM for sound signal transmission.
6. Synchronizing pulses transmitted along with the picture signal justify the statement.
7. Describe the basic principle of monochrome television transmission and reception.
8. How is the illusion of continuity created in television pictures? Why has the frame reception rate been chosen to be 25 and not 24 as in motion pictures?
9. Draw a picture frame chart showing the total number of active and inactive lines during each field and establish the need for terminating the first field in a half line and the beginning the second at the middle of a line at the top.
10. Justify the choice of 625 lines for TV transmission. Why the total number of lines is kept odd in all television systems? What is the significance of choosing the number of lines as 625 and not 623 or 627?
11. The relevant data for a closed circuit TV system is given below. Calculate the highest modulating frequency that will be generated while scanning the most stringent case of alternate black and white dots for equal vertical and horizontal resolution.

    No. of lines = 250
    Interlace ratio = 1:1
    Picture repetition rate = 50/sec
    Aspect ratio = 4/3
    Vertical retrace time = 10% of the picture frame time
    Horizontal retrace time = 20% of the total line time
    Assume resolution factor = 0.8

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Question Bank

Unit 3: Colour Television Standards

1. With a neat diagram discuss additive & subtractive colour theory.
2. Compare NTSC and PAL colour television standards.
3. Discuss the PAL TV standard in detail.
4. With a neat diagram explain TV Broadcasting system.
5. What do you understand by compatibility in TV transmission? Enumerate essential requirements that must be met to make a colour system fully compatible.
6. Discuss how the 'Y' and colour difference signals are developed from camera outputs. Why is the 'Y' signal set = 0.3R + 0.59G – 0.11B?
7. Discuss the factors which influence the choice of sub-carrier frequency in a colour TV system. Justify the choice of 3.579545 MHz as the subcarrier frequency in the NTSC system. How does it affect the line and field frequencies?
8. Discuss why is the modulated sub-carrier vectors shifted by 33° to constitute Q and I signal in the NTSC system? Why different bandwidths are assigned to Q and I signals?
9. There vertical line up dots occur in hue of colour TV how these can be overcome and also give the relationship between fsc, fh and fv.
10. From the data calculate the Colour Subcarrier for Unweighted parameters.
11. From the data calculate the Colour Subcarrier for Weighted parameters.
12. Explain with a suitable block diagram the encoding process in the PAL colour system. Why is the colour burst signal transmitted after each scanning line?

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Question Bank

Unit 4: Digital Television

1. Draw a neat block diagram of a digital video transmitter and discuss the function of each block.
2. Discuss advantages of digital television.
3. Explain how surround sound effect is produced in a digital TV system.
4. Discuss how a picture-in-picture feature can be obtained in a TV.
5. Discuss the working of a closed circuit television.
6. What is MATV? How did it originate? Discuss its working.
7. Compare of CATV, CCTV and MATV
8. Discuss the features of H.264.
9. Describe CATV system. How does it differ from MATV system?

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Question Bank

Unit 5: Multimedia Components

1. Discuss different MIDI related terms. (Synthesizer, sequencer, MIDI keyboard controller, multi-timbral, polyphony)
2. Discuss different image data types and their file formats.
3. Discuss musical instrument digital interface (MIDI) and its role.
4. List down important MIDI concepts.
5. Define the term Multimedia & Hypermedia with suitable examples.

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Unit 6: Data Coding and Compression Techniques

1. Discuss bit allocation algorithm for MPEG-1 Layer 1 and Layer 2.
2. Discuss the MPEG audio encoder with suitable block diagram.
3. Discuss the MPEG-1 audio Layers 1 and 2 with suitable block diagram.
4. Discuss the MPEG-1 audio Layers 3 with suitable block diagram.
5. Illustrate with a neat diagram the different layers of MPEG.
6. With a neat diagram discuss JPEG Encoder.
7. List down different JPEG modes and discuss any one mode.
8. Explain three-level hierarchical JPEG encoder.
9. Discuss the terms MPEG & JPEG in detail.
10. Give the difference between lossless & lossy compression techniques?
11. Discuss the benefits offered by compression schemes in designing multimedia systems.

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Question Bank

Unit 7: Multimedia Applications

1. Compare headphones and headset.
2. Illustrate with a neat diagram the design for PA system for public meeting.
3. With a neat diagram explain Public addressing system for Auditorium.
4. Define virtual reality; also discuss its different forms & applications.

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Question Bank

Subject: Object Oriented Modeling & Design (Elective)

Department: Computer Science and Engineering

Class: T. Y. B. Tech. (CSE) Sem-II (New w.e.f. Nov. 2020)

1. Differentiate between Object model and Dynamic Model
2. Differentiate between Object model and Functional model.
3. Differentiate between Functional model and Dynamic Model
4. Elaborate different types of Inheritance.
5. What do you mean by model? Elaborate the stages in Object oriented methodology.
6. Elaborate various object oriented themes
7. Summarize the relationships use in class diagram.
8. Illustrate multiplicity use for association.
9. What is Inheritance? Describe the concepts of Inheritance for specialization and generalization with suitable examples.
10. What is object orientation? Elaborate the aspects of objects orientation With an example, state qualified association.
11. What is propagation of operation? Elaborate with an example
12. Elaborate constraints on object and constraints on link with an example
13. Write short note
    a. Package
    b. Component
14. Write short note
    a. Aggregation
    b. Compostion
15. Elaborate Multiplicity association relationship with suitable example
16. Elaborate Dependency relationship with an example
17. Elaborate Single Inheritance with suitable example
18. Elaborate Multiple inheritance with suitable example
19. Construct a suitable class diagram for online COVID-19 vaccination booking system demonstrating aggregation relationship.
20. Construct an Instance model for “Banking System” and show an appropriate relation in between them.
21. Construct an Instance diagram for “Library Management System”.

22. Construct an class diagram for “Hospital management system” and shows appropriate relation in between them (No. of classes to be included are as follows: Doctor, Patient, Reception, Dept., Rooms, Bills)
23. Sketch a Class diagram for Collage management system and shows appropriate relation in between them (No. of classes to be included are as follows: Admin, Teacher, Student, Subject, Division, Class, Test)
24. Sketch a class diagram for Movie ticket booking system demonstrating aggregation relationship
25. Sketch a class diagram for demonstrating generalisation relationship (No of classes: Employee, Manager, Programmer, Project Manager, Dept Manager, and Strategic Manger.)
26. Sketch a object diagram for online hotel booking system demonstrating aggregation relationship.
27. Sketch a object diagram for demonstrating generalisation relationship (No of object classes: Employee, Manager, Programmer, Project Manager, Dept Manager, Strategic Manger)
28. How generalization can be used as extension and restriction? Elaborate with an example.
29. Elaborate Relation of Object to dynamic model and functional model
30. Define the terms Events, states, Operations, concurrency.
31. Elaborate Nested state diagrams with suitable example.
32. Sketch a state diagram for online Air ticket booking system.
33. Elaborate Synchronization of Concurrent Activities with an example
34. Elaborate Aggregation Concurrency with an example
35. Elaborate Concurrency within an Object with an example
36. Elaborate Functional model components.
37. Draw DFD for COVID Vaccination system.
38. What is meant by levelling, Elaborate farm management system with help of levelling.
39. Elaborate Use of programming language and database system in Implementation of OMT
40. What are the various steps used to build object and dynamic model.
41. Draw event flow for ATM
42. Draw Event trace for phone call activity.
43. Draw State Diagram for Music playlist.
44. Elaborate Guards, Activities and Actions with an example.
45. What are the OMT notation for dynamic model and functional model?

46. Elaborate various Object-oriented style
47. Elaborate various feature of object-oriented languages
48. Design applications of OMT like object diagram compiler or Computer Animation
49. Elaborate different views of UML
50. Elaborate are the various building blocks of UML.
51. Elaborate various Goals of UML
52. Elaborate Functional View of UML
53. Elaborate Static Structural View of UML
54. Elaborate Behavioral (dynamic structural) view of UML
55. Architectural View of UML
56. Draw composite structure diagram for Home automation system.
57. Design a Deployment diagram for hospital management system.
58. What are the components of use case?
59. Design a use case diagram for Online HR System.
60. How swimlane are helpful in activity diagram?
61. Design a activity diagram for ATM transaction using swimlanes.
62. Differentiate between communication diagram and composite structure diagram.
63. Draw a state machine diagram for preventing COVID-19 from spreading when you enter into an public place and what actions should be taken if infected by virus.
64. Elaborate Forking and Joining with suitable example.
65. Elaborate Kruchten's 4+1 View Model.
66. What are different elements of component diagram?
67. Sketch a component diagram for inventory management system.
68. Elaborate the steps for system design in OMT.
69. Elaborate the steps for Object Design in OMT.
70. Provide the guidelines for Programming-in-the-large Style
71. Provide the guidelines for Robustness Style
72. Elaborate different relationships used in Deployment Diagram with examples.
73. Differentiate between Creational, Structural and Behavioural Patterns
74. Elaborate Observer Pattern with an example.
75. Write a short note on
    a. Pipe and filter architectural style
    b. layered architectures style
76. Which architectural style is suitable for banking? Justify your answer.

T.Y. B.Tech . CBCS Semester: II

Industrial and Quality Management

Question Bank

Q1. How nature & purpose of management can be explained?

Q2. Explain various functions of management ?

Q3. A manager in industry requires to perform different managerial roles. Which are those roles?

Q4. Which are different managerial skills required in Industry?

Q5. Management doesn't exist in air. There is specific system approach to management process. Elaborate

Q6. Which social responsibilities a manager have ?

Q7. Which are the ethics in management?

Q8. Explain importance & limitations of decision making

Q9. Which are different types of plans?

Q10. What is organizing ? explain nature & types of organizations

Q11. Explain meaning of departmentation?

Q12. Explain departmetation by product and by geography

Q13. How authority, power and empowerment differs?

Q14. How weak delegation of authority can be overcome?

Q15. How a candidate is selected in Industry? explain the process

Q16. Which are different appraisal processes

Q17. Explain various steps in planning of any event/activity

Q18. How a decision can be taken from alternatives? explain

Q19. Which are different types of decisions?

Q20. How narrow span and wide span differs?

Q21. What is matrix organization & strategic business units ?

Q22. Explain what is line and staff concept and issues with this concept

Q23. What is meaning of decentralization

Q24. How a authority can be delegated? explain the process

Q25. Many times authority is not delegated properly. How weak delegation can be avoided?

Q26. What are skills & personal characteristics needed in managers ?

Q27. What is organizational development? how to do development at various levels?

Q28. List down various human factors in managing?

Q29. What is Maslow's hierarchy of need

Q30. Explain in details McGregor's theory X & theory Y with its limitations

Q31. How Carrot and stick theory can be explained

Q32. Which are special motivation techniques ?

Q33. How will you define leadership. Which characteristics are required to become good leader?

Q34. What is leadership behavior and style. Explain

Q35. Explain four extreme styles of managerial grid with diagram

Q36. Define communication and explain the process with diagram

Q37. Elaborate different types of communication with example.

Q38. Many times a message is not communicated properly. Which are barriers for communication

Q39. What is controlling? Explain basic controlling process

Q40. How marketing and selling differs. Explain in details

Q41. What are various functions of marketing

Q42. Explain various responsibilities of marketing manager

Q43. Define channels of distribution. Explain importance of channels of distribution

Q44. What is channel of distribution of consumer goods and explain it for consumer goods too

Q45. What is sales promotion? How it differs from advertising?

Q46. What are various objectives of sales promotion?

Q47. Explain different sales promotion scheme

Q48. What is advertising? Explain function & objectives of advertising.

Q49. Explain various types of media

Q50. Explain the considerations for selecting particular media

Q51. Explain in detail various functions of financial management

Q52. Which are different sources of finance?

Q53. Explain the terms production, planning & control separately. Define PPC

Q54. What are objectives and functions of PPC

Q55. Explain benchmarking process in detail

Q56. Define quality and explain various elements of quality

Q57. What is meaning of quality of design? which are the factors that affects quality of design

Q58. Write short note on six sigma

Q59. Explain quality control process

Q60. Which are different cost of quality? Explain optimum cost of quality

Q61. Explain quality of conformance and factors affecting it

Q62. What is quality management system. Explain in details

Q63. Name various quality gurus & Write short note on any 3 quality gurus

Q64. Customer satisfaction helps business to grow. Explain how

Q65. Write short note on continuous improvement process

Q66. What is employee involvement? how it can be improved?

Q67. Explain environment management system in detail

Q68. Write detail note on supplier partnership

Q69. Explain check sheets and graphs in detail

Q70. What is pareto analysis and cause effect diagram. explain with diagram

Q71. Differentiate between variable and attributes characteristics

Q72. Write short note on X chart and R chart

Q73. What is acceptance sampling?

Q74. Explain control charts and scatter diagram in detail

Q75. Explain single sampling and double sampling process

Q76. Explain consumer risk and producer risk

Q77. Explain P and C charts

Q78. Write short note on OC curve with diagram

Q79. Explain the terms AQL, RQL, IQL, AOQ

Q80. Following are the inspection results of magnets for 15 observations

Week No.	No. of magnets inspected	No. of defective magnets
1	724	48
2	763	83
3	748	70
4	748	85
5	724	45
6	727	56

7	726	48
8	719	67
9	759	37
10	745	52
11	736	47
12	739	50
13	723	47
14	748	57
15	770	51
Total	**11099**	**843**

Calculate average fraction defective and 3σ control limits, construct the control charts and state whether the process is in statistical control.

Q81. A manufacturer purchases springs in cartons that usually contains several thousands of springs. Each shipment consist of a number of cartons. As a part of acceptance procedure for these springs, 400 bolts are selected at random from each carton & are subjected to visual inspection for certain defect. In shipment of 10 cartons the respective percentage of defectives in the samples from each carton are 1, 2.5, 0.75, 0.5, 0, 3.0, 0.25, 0, 0.25 & 1.25. Does this shipment of bolts appear to exhibit statistical control with respect to the quality characteristics examined in the inspection?

Q82. An analyst takes 20 samples of size 200 each from the output of final assembly line. The items In each sample are inspected and the number of defectives on each sample are recorded. The results are given in table below. Calculate the avg fraction defective and the control limits for a chart for fraction defectives.

Sample No	No. of defectives	Fraction defectives	Sample No	No. of defectives	Fraction defectives
1	9	0.045	11	26	0.130
2	7	0.035	12	18	0.09
3	14	0.07	13	11	0.055
4	15	0.075	14	8	0.040
5	8	0.040	15	10	0.050
6	7	0.035	16	10	0.050
7	9	0.045	17	15	0.075
8	11	0.055	18	13	0.065
9	16	0.080	19	9	0.045
10	12	0.060	20	12	0.060

Suppose that some time after the chart has been established a sample of 300 items is taken and found it contains 25 defectives. Does time result suggest that a satisfactory population mean is being maintained

Q83. The following table gives the no. of missing shaft keys noted at assembly final inspection.

Assembly no	No. of missing shaft keys	Assembly no	No. of missing shaft keys	Assembly no	No. of missing shaft keys
1	22	10	12	19	11
2	12	11	23	20	9
3	15	12	16		
4	9	13	9		
5	7	14	25		
6	3	15	15		
7	14	16	9		
8	20	17	9		
9	6	18	14		

Find c, compute trial control limits, and plot control chart for c. what values of c would you suggest for the subsequent period ?

Q84. A single sampling plan uses a sample size of 35, & an acceptance number 3. Using hyper geometric probabilities, compute the probability of acceptance of lots of 100 articles 3% defective.

Q85. In a single sampling plan N = 10000, C = 1 find sample size when probability of acceptance is 0.5 % defective lot is 0.558. calculate AOQ

S.Y.B.Tech (CSE) (Part-I) Examination-June\July-2022

Subject: Computer Networks(New)

Question Bank

4 marks

1) With a neat diagram explain the physical and data link layer of OSI reference model
2) With a neat diagram explain the Network, Transport Layer of OSI reference model
3) With neat diagram explain Application, Presentation and Session layer of OSI reference model
4) Explain Physical and Logical Addresses of TCP/IP protocol suite in detail
5) Explain Port and Application Specific Addresses of TCP/IP protocol suite in detail.
6) Describe the OSI reference model
7) Describe Host to network layer of TCP/IP Protocol suite
8) Describe Application layer of TCP/IP Protocol suite
9) Describe Internet layer of TCP/IP Protocol suite
10) What is IP Datagram? Explain with a neat diagram.
11) Explain the position of UDP in the TCP/IP protocol suite.
12) Explain the user datagram protocol format in TCP/IP protocol suite.
13) List and explain the different services of UDP.
14) Explain in detail pseudo header for checksum calculation with a neat diagram.
15) Explain the encapsulation and decapsulation process in detail in UDP with a neat sketch.
16) Explain the multiplexing and demultiplexing concepts in UDP.
17) List and explain the different application of UDP.
18) Write a short on Error Control in SCTP
19) List and explain the different Features of TCP.
20) Explain in detail send windows and receive windows concepts in TCP.
21) Write a short note on Flow control in TCP
22) Write a short note on Error control and flow control in TCP
23) Write a short note on Congestion control in TCP

24) Describe the Web based mail.
25) Explain in detail MIME concepts in Email.
26) Explain the client-server concept in detail, with a neat sketch.
27) Explain the concurrency client-server concept in detail, with a neat sketch.
28) What is meant by socket? List and explain the different fields of socket.
29 List and explain the different types of socket.
30 Explain the socket structure in detail
31 Socket address structure in detail
32) Describe a) Big-Endian Byte order
b) Little-Endian Byte order
c) Byte order Transformation
33) Explain in detail a) Address Transformation
b) Memory management function
34) Explain the connection oriented concurrent server (client and server)
35) Explain the connectionless iterative server (client and server)
36) What is client and Describe concurrency in client.
37) Write a short note on BOOTP.
38) Explain the different operations of BOOTP.
39) Explain in detail Mail transfer phase in SMTP.
40) Write a short note on DHCP.
41) What is DNS? Explain in detail.
42) What is name space? Explain the types of name space.
43) What is name space? Explain Distribution of Name Space in detail.
44) What is Resolution? Explain in the same in detail.
45) Describe the DHCP packet format with a neat diagram.
46) Explain in detail DNS Messages.
17) Explain in detail Types of Records in DNS.
48) Write a short note on TELNET
49) Describe about the TELNET Login phase.
50) Write a short note on Embedding.
51) Write a short note on Options in TELNET.
52) Write a short note on Sub option Negotiation.
53) Write a short note on controlling the server.
54) Write a short note on Out –of –Band signaling.
55) Write a short note on Escape character in TELNET.

56) Write a short note on Post office Protocol (POP3)
57) Write a short note on TFTP.
58) Write a short on TFTP Data Transfer and connection.
59) Explain with a neat diagram IMAP4
60) Explain the USER AGENT (UA) concepts in E-mail System.

6 marks

1) List and explain the different typical application of UDP.
2) What is segment? Explain in detail TCP segment format.
3) Explain the connection establishment in TCP connection using three way hands shaking.
4) Explain in detail different types of TFTP Messages.
5) What is TCP Timer? Describe the different types of TCP Timers.
6) Explain in detail the TCP packets with a neat sketch.
7) Explain the different services of SCTP.
8) Explain the services of user agents in E-mail.
9) List and explain the different Features of SCTP.
10) List and explain the different services of TCP.
11) Comparison between OSI and TCP/IP Protocol Suite
12) Explain the different layers in the TCP/IP Protocol suite
13) Describe Classfull addressing.
14) Describe special addressing.
15) Describe NAT(Network Address Translation).
16) What is fragmentation? Describe the fields related to fragmentation with n example.
17) Explain the Architecture of E-mail with Four different scenarios.
18) Explain in detail four levels of addressing in TCP/IP protocol suite.
19) What is byte ordering? Explain byte ordering functions in detail.
20) With a neat diagram explain the Message Access Agent (MAA) in POP and IMAP.
21) List and explain all the socket system calls.
22) Explain the socket interface for connectionless iterative server
23) Explain in detail Domain Name Space?
24) Explain the socket interface for connection oriented server.
25) Describe the types of DNS Messages in detail.
26) Explain SSH Components, Port Forwarding, Format of SSH packages.
27) Explain in detail Distribution of Name Space?
28) Explain in detail DNS in the internet?
29) Explain in detail about Network Virtual Terminal (NVT).
30) Write a short note on Mode of Operations in TELNET.

P.A.H. Solapur University, Solapur
Subject: Database Engineering
Class: T. Y. B. Tech Computer Science Engineering
Question Bank

1. Explain DDL and DML with example

2. Write and Explain the components of storage manager

3. Write and explain the advantages of DBMS over conventional file system

4. Write and Explain the components of storage manager

5. List and Explain database users.

6. Explain the difference between two-tier and three-tier architectures. Which is better suited for Web applications? Why?

7. Explain various integrity constraints.

8. Explain different types of keys with example.

9. Explain types of attribute with example.

10. Explain constraints on generalization with example.

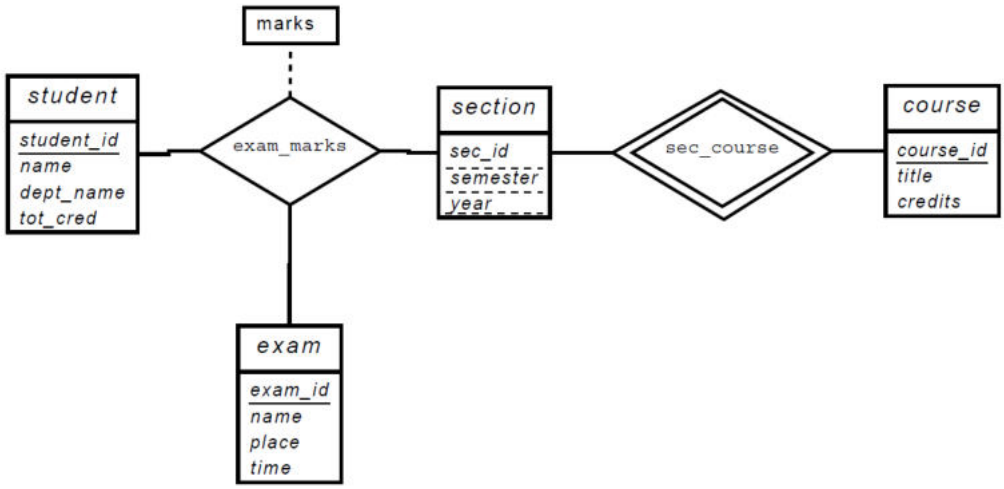
11. Explain the distinctions among the terms primary key, candidate key, and superkey

12. Explain generalization and specialization with example.

13. Construct an E-R diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Each insurance policy covers one or more cars, and has one or more premium payments associated with it. Each payment is for a particular period of time, and has an associated due date,

and the date when the payment was received. List also entity, relationship along with attributes and primary key.

14. Reduce the following ER diagram to relational schema. Mention the primary key and foreign key constraints of relations



15. Explain the additional operation in relational algebra with the help of example.

16. Explain basic structure of SQL queries with the help of example

17. Consider the following database schema. Write the queries using tuple relational calculus

branch (*branch_name*, *branch_city*, *assets*)
customer (*customer_name*, *customer_street*, *customer_city*)
loan (*loan_number*, *branch_name*, *amount*)
borrower (*customer_name*, *loan_number*)
account (*account_number*, *branch_name*, *balance*)
depositor (*customer_name*, *account_number*)

a. Find all customers who have both a loan and an account.
b. Find all customers who have a loan or an account or both.
c. Find all customers who have a loan but not an account

18. Consider the following database schema. Write the queries using relational algebra

branch (*branch_name*, *branch_city*, *assets*)
customer (*customer_name*, *customer_street*, *customer_city*)

loan (*loan_number, branch_name, amount*)
borrower (*customer_name, loan_number*)
account (*account_number*, *branch_name, balance*)
depositor (*customer_name, account_number*)

a. Find all customers who have both a loan and an account.
b. Find all customers who have a loan or an account or both.
c. Find all customers who have a loan but not an account
d. Find the names of all customers who have a loan at the bank, along with the loan number and the loan amount.
e. Find the names of all branches with customers who have an account in the bank and who live in Harrison
f. Find all customers who have an account at *all the* branches located in Brooklyn

19. Consider the following database schema. Write the queries using SQL

branch (*branch_name, branch_city, assets*)
customer (*customer_name, customer_street, customer_city*)
loan (*loan_number, branch_name, amount*)
borrower (*customer_name, loan_number*)
account (*account_number*, *branch_name, balance*)
depositor (*customer_name, account_number*)

a. Find all customers who have both a loan and an account (eliminate duplicates if exists)
b. Find all customers who have a loan or an account or both (eliminate duplicates if exists)
c. Find all customers who have a loan but not an account (eliminate duplicates if exists)
d. Find all customers who have a loan or an account or both.
e. Find all customers who have both a loan and an account.

20. Consider the following database schema considered in Q2c. Write the queries using domain relational calculus and SQL

branch (*branch_name, branch_city, assets*)
customer (*customer_name, customer_street, customer_city*)
loan (*loan_number, branch_name, amount*)

borrower (*customer_name, loan_number*)
account (*account_number*, *branch_name, balance*)
depositor (*customer_name, account_number*)

a. Find all customers having account.
b. Find all customers who have both a loan and an account.
c. Find all customers who have a loan or an account or both.
d. Find all customers who have a loan but not an account
e. Find all customers who have both a loan and an account at Perryridge branch.
f. Find all customers who have a loan or an account or both at Perryridge branch.
g. Find all customers who have a loan but not an account at Perryridge branch

21. Check if the decomposition of R into D is lossless:
    a. R(ABC): F = {A → B, A → C}. D = R1(AB), R2(BC)
    b. R(ABCDEF): F = {A → B, B → C, C → D, E → F}. D = R1(AB), R2(BCD), R3(DEF)

22. Explain the algorithm for Canonical Cover and find the Minimal Cover or Irreducible Sets or Canonical Cover of a Set of Functional Dependencies: AB → CD, BC → D

23. What is lossy and lossless decomposition? Consider the following table

ID	name	street	city	salary
57766	Kim	Main	Perryridge	75000
98776	Kim	North	Hampton	67000

Decompose this relation in lossy as well as lossless decomposition

24. Let *R* be a relation schema R(A, B, C, D, E)

A	B	C	D	E
a	2	3	4	5
b	a	3	4	5

c	**2**	**3**	**6**	**5**
d	**2**	**3**	**6**	**6**

Check the following functional dependency on the relation R

a. A → B
b. A → CD
c. A → BCDE
d. A → C
e. BD → C
f. ABDE → C
g. C → DE

25. Explain BCNF normal form with example

26. Explain first normal form with example

27. Find Prime Attributes and non-prime attribute using Functional Dependencies:
    a. R(ABCDEF) having FDs {AB→C, C→D, D→E, F→B, E→F}
    b. R(ABDLPT) having FDs {B → PT, A → D, T → L}

28. Explain ordered indices

29. Write a note on Multiple key access

30. Explain primary, clustering, secondary indexing and multilevel indexing.

31. Compare Static Hashing Vs Dynamic Hashing

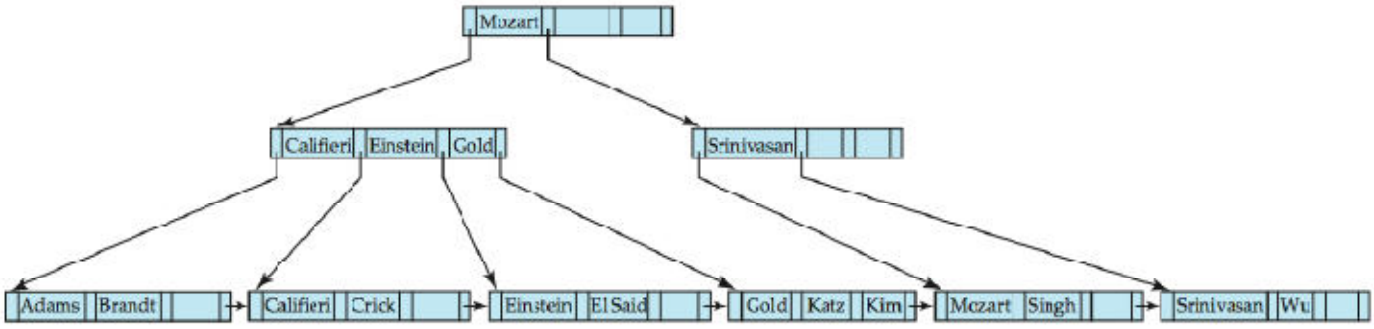
32. Explain B+ tree with an example and how insertion and deletion works.

33. What are bitmap indices? In the following table, new_emp is the column to be indexed. What is the content of the bitmap index?(Consider 4-bit data)

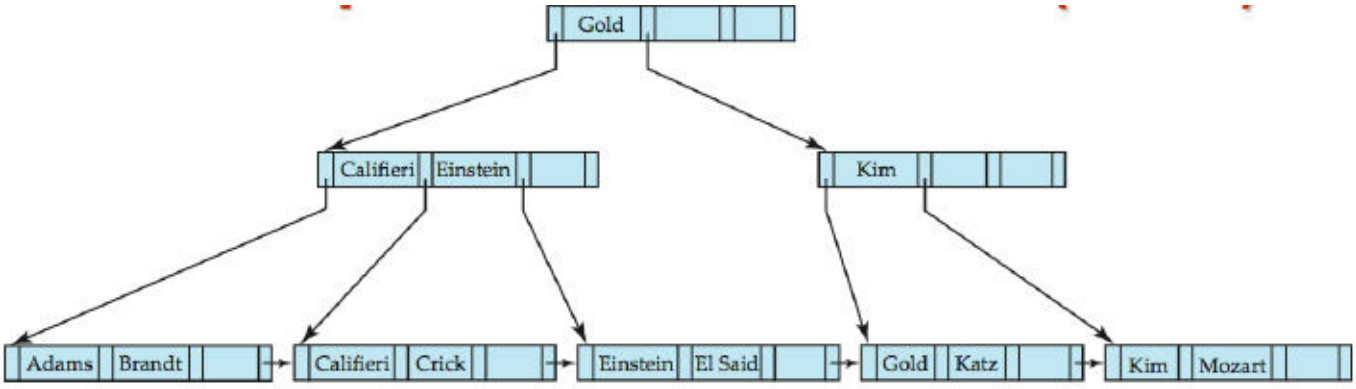
employee

emp id	emp name	job	new emp	salary
e-123	riju	analyst	yes	35000
e-345	neha	salesperson	no	30000
e-567	suresh	clerk	no	25000
e-998	sneha	manager	yes	50000

34.Draw the B+ tree after inserting “Lamport” in this tree



Draw the B+ tree after deleting “Gold” from this tree



35.Explain the distinction between the terms serial schedule and serializable schedule

36.Explain ACID properties.

37.Consider the following transactions and schedule

Transaction 1

UPDATE accounts

SETbalance=balance-100

WHEREacct_id=31414

Transaction 2
UPDATE accounts
SETbalance=balance*1.005

ScheduleT:r1(A), r2(A), w2(A), w1(A), r2(B), w2(B)
What will be the values of A and B after schedule T if the initial values are A=200 and B=100?

38. Check whether the schedule is view serializable or not?
S : R2(B); R2(A); R1(A); R3(A); W1(B); W2(B); W3(B);

39. Consider the following schedule for transaction T1,T2 and T3
R1(X)R2(Y)R3(Y)W2(Y)W1(X)W3(X) R2(X) W2(X)
Find out serializable schedule sequence.

40. Explain view serializability with example

41. Explain conflict serializability with example

42. Consider the following schedule for transaction T1,T2 and T3
R1(X)R2[Y)R3(Y)W2(Y)W1(X)W3(X)R2(X)W2(X)
Find out serializable schedule sequence.

43. Explain two phase locking protocol with strict and rigorous 2PL with example.

44. Explain deadlock detection and recovery.

45. Explain validation based protocol with example

46. Explain lock based protocol with the help of example.

47. Explain log based recovery algorithm with example.

48. Explain the types of failure

49. Explain immediate log recovery system with example

50.Explain deferred log recovery system with example

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P.A.H. Solapur University, Solapur
Subject: Discrete Mathematical Structures
Class: S.Y. B. Tech Computer Science Engineering
Question Bank

1. Construct the truth table for the following formulas
   a. $(\neg P \wedge (\neg Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R)$
   b. $(P \wedge Q) \vee (\neg P \wedge Q) \vee (P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

2. Given the truth values of P and Q as T and those of R and S as F, find the truth values of the following
   a. $(\neg (P \wedge Q) \vee \neg R) \vee (((\neg P \wedge Q) \vee \neg R) \wedge S)$
   b. $((\neg P \wedge Q) \vee \neg R) \vee ((Q \leftrightarrow \neg P) \rightarrow (R \vee \neg S))$

3. From the formulas given below select those which are well-formed and indicate which ones are tautologies and contradictions
   a. $((P \rightarrow (Q \rightarrow R)) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R)))$
   b. $((\neg P \rightarrow Q) \rightarrow (Q \rightarrow P)))$

4. Produce the substitution instances of the following formulas for the given substitutions
   a. $(((P \rightarrow Q) \rightarrow P) \rightarrow P)$; substitute $(P \rightarrow Q)$ for P and $((P \wedge Q) \rightarrow R)$ for Q
   b. $((P \rightarrow Q) \rightarrow (Q \rightarrow P))$; substitute Q for P and $(P \wedge \neg P)$ for Q

5. Express $P \rightarrow (\neg P \rightarrow Q)$ in terms of $\uparrow$ only. Express the same formula in terms of $\downarrow$ only.

6. Write a formula which is equivalent to the formula $P \wedge (Q \leftrightarrow R)$ and contains the connective NAND only. Obtain as equivalent formula which contain the connective NOR only.

7. Obtain the PCNF and PDNF of the following formulas. Which of the following formulas are tautologies?
   a. $P \vee (\neg P \rightarrow (Q \vee (\neg Q \rightarrow R)))$
   b. $(P \rightarrow (Q \wedge R)) \wedge (\neg P \rightarrow (\neg Q \wedge \neg R))$
   c. $P \rightarrow (P \wedge (Q \rightarrow P))$

8. Write the following formulas in prefix and suffix form. The following precedence is assumed: $\leftrightarrow$, $\rightarrow$, $\vee$, $\wedge$, $\neg$ ($\neg$ having the highest precedence)
    d. $P \wedge \neg R \rightarrow Q \leftrightarrow P \wedge Q$
    e. $\neg\neg P \vee Q \wedge R \vee \neg Q$

9. Convert the following prefix and suffix formulas into completely parenthesized form. Also write then in an infix form using the above order of precedence to minimize the number of parentheses.
    a. $\rightarrow \neg P \vee Q \leftrightarrow R \neg S$
    b. $\rightarrow \rightarrow P Q \rightarrow \rightarrow Q R \rightarrow P R$

10. Show the validity of the following arguments for which the premises are given on the left and conclusion on right.
    a. $(P \wedge Q) \rightarrow R, \neg R \vee S, \neg S$ $\neg P \vee \neg Q$
    b. $P \rightarrow Q, Q \rightarrow \neg R, R, P \vee (J \wedge S)$ J S
    c. $B \wedge C, (B \leftrightarrow C) \rightarrow (H \vee G)$ $G \vee H$

11. Derive the following using CP rule
    a. $\neg P \vee Q, \neg Q \vee R, R \rightarrow S \Rightarrow P \rightarrow S$
    b. $P, P \rightarrow (Q \rightarrow (R \wedge S)) \Rightarrow Q \rightarrow S$

12. Show that following premises are inconsistent
    a. $P \rightarrow Q, P \rightarrow R, Q \rightarrow \neg R, P$
    b. $A \rightarrow (B \rightarrow C), D \rightarrow (B \wedge \neg C), A \wedge D$

13. Given S = {a1, a2, a3, a4, a5, a6, a7, a8}, what subsets are represented by B_{17}, B_{31}? Also how will you designate the subsets {a2, a6, a7} and {a1, a8}

14. Given A = {x | x is an integer and $1 \leq x \leq 5$}, B = {3, 4, 5, 17} and C = {1, 2, 3,…}, find $A \cap B$, $A \cap C$, $A \cup B$, and $A \cup C$

15. Given A = {2, 3, 4}, B = {1, 2} and C = {4, 5, 6}, find A+B, B+C, A+B+C and (A+B)+(B+C)

16. Write the members of $\{a, b\} \times \{1, 2, 3\}$.

17. Write $A \times B \times C$, B^2, A^3, $B^2 \times A$, and $A \times B$ where A = {1}, B = {a, b} and C = {2, 3}.

18. Show by means of example $A \times B \neq B \times A$ and $(A \times B) \times C \neq A \times (B \times C)$

19. Explain the properties of relation with example

20. Give an example of a relation which is both symmetric and Antisymmetric.

21. Show that whether the following relations are transitive

    R1 = {<1, 1>}

    R2 = {<1, 2>, <2, 2>}

    R3 = {<1, 2>, <2, 3>, <1, 3>, <2, 1>}

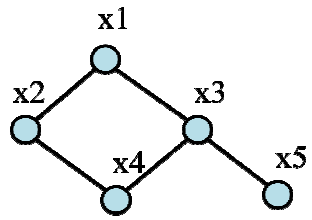
22. Given a set S = {1, 2, 3, 4, 5}, find the equivalence relation on S which generates the partition {{1, 2}, {3}, {4, 5}}. Draw the graph of the relation.

23. Given the relation matrix M_R of a relation R on the set {a, b, c}, find the relation matrices of $R^{\sim}$, $R^2 = R \circ R$, $R^3 = R \circ R \circ R$, and $R \circ R^{\sim}$

    MR = $\begin{pmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{pmatrix}$

24. Let A be the set of factors of a particular positive integer m and let $\leq$ be the relation divides i.e. $\leq$ = {<x, y> | $x \in A \wedge y \in A \wedge$(x divides y)}. Draw Hasse diagram for
    a. m = 12
    b. m = 45
    c. m = 36

25. Figure gives the Hasse diagram of a partially ordered set <P, R> where P = {x1, x2, x3, x4, x5}



Find which of the following are true

a. x1Rx2
b. x4Rx1
c. x3Rx5
d. x2Rx5
e. x1Rx1
f. x2Rx3
g. x4Rx5

Find the least and greatest members in P if they exists.

Also find the maximal and minimal element of P.

Find the upper bound and lower bound of {x2, x3, x4}, {x3, x4, x5} and {x1, x2, x3}.

Also indicate the LUB and GLB of these subsets if they exist.

26. Which of the following systems satisfy the properties of <I,+,X> which are designated by (A-1) to (A-4), (M-1) to (M-3) and distributive for the following set where all elements are odd integers.

27. Simplify the following Boolean expressions: (a *b)' + (a +b)'

28. Prove the theorem that the kernel of homomorphism g from a group <G,*> to <H , δ > is a semigroup of < G,*>.

29. Prove the following Boolean identity
(a + (a' * b) = a + b

30. Obtain the sum-of products and products-of-sums canonical forms of the following expression. $[(x_1 + x_2)\ (x_3\ x_4)']'$

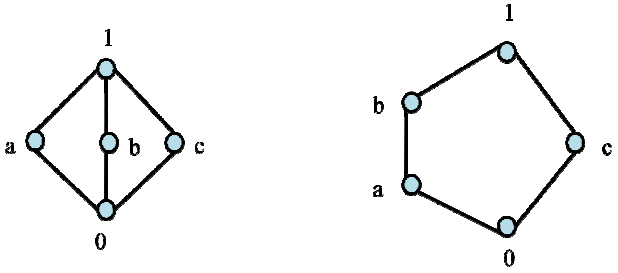
31. Prove that the set G = {1, 2, 3, 4, 5, 6, 7} is a group with respect to multiplication modulo

32. List all possible functions from X = {a, b, c} to Y = {0, 1} and indicate in each case whether the function is one-to-one, is onto, and is one-to-one onto.

33. List all possible functions from X = {x, y, z} to Y = {5, 6} and indicate in each case whether the function is one-to-one, is onto, and is one-to-one onto.

34. Prove that the set G = {0, 1, 2, 3, 4} is a monoid with respect to addition modulo.

35. Show that the following simple but significant lattices are not distributive.

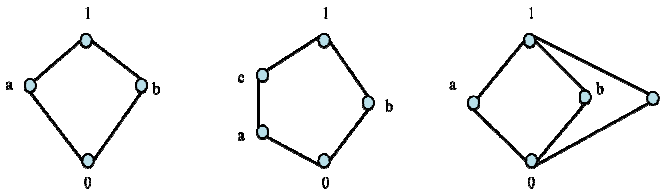


36. Let A = {a, b}, check whether the following table define a semigroup or monoid on A?

*	a	b
a	a	a
b	b	b

37. Prove that the set G = {0, 1, 2, 3, 4, 5, 6, 7} is an abelian group with respect to addition modulo 8.

38. What are different types of lattice? Explain with example. Show that the lattices shown in Fig (a), (b) and (c) are complemented lattices.



39. Show that the (2, 6) encoding function e: B2 → B6 defined by

e(00) = 001000
e(01) = 010100
e(10) = 100010
e(11) = 110001

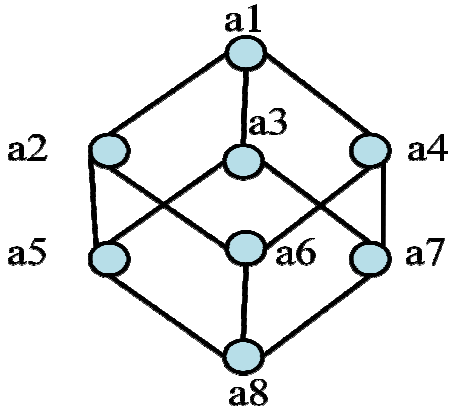
is a group code.

How many errors can it detect and correct?

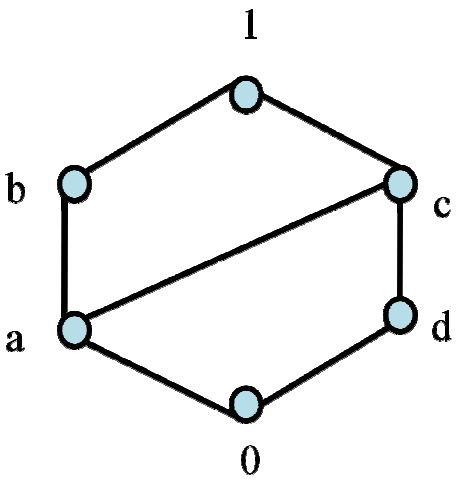
40. Explain about group codes with suitable example.
41. Explain algorithm for conversion of Infix Expression to Polish Notation
42. What is rank of formula? Explain with example
43. What is algebraic system? Explain with example
44. What is semigroup? Explain with example
45. What is monoid? Explain with example
46. What is group? Explain with example
47. Find the complements of every element of lattice $<S_n, D>$ for n = 75.

48. Explain the term lattice with example.

49. Let $<L,\leq>$ ba a lattice in which L = {a1, a2, …, a8} and S1, S2 and S3 be the subsets of L given by S1 = {a1, a2, a4, a6}, S2 = {a3, a5, a7, a8} and S3 = {a1, a2, a4, a8}. Check whether S1, S2 and S3 are sublattice?



50. Show that the following simple but significant lattice is distributive


1
b
c
a
d
0

S.Y.B.Tech (CSE) (Part-I) Examination-June\July-2022

Subject: Computer Networks (old)

Question Bank

4 marks

1) What is IP Datagram? Explain with a neat diagram.
2) Explain the position of UDP in the TCP/IP protocol suite.
3) Explain the user datagram protocol format in TCP/IP protocol suite.
4) Explain Physical and Logical Addresses of TCP/IP protocol suite in detail
5) Explain Port and Application Specific Addresses of TCP/IP protocol suite in detail.
6) List and explain the different application of UDP.
7) Write a short on Error Control in SCTP
8) List and explain the different Features of TCP.
9) Explain the USER AGENT (UA) concepts in E-mail System.
10) Explain in detail send windows and receive windows concepts in TCP.
11) Write a short note on Flow control in TCP
12) Write a short note on Error control and flow control in TCP
13) List and explain the different services of UDP.
14) Explain in detail pseudo header for checksum calculation with a neat diagram.
15) Explain the encapsulation and decapsulation process in detail in UDP with a neat sketch.
16) Explain the multiplexing and demultiplexing concepts in UDP.
17) Explain the client-server concept in detail, with a neat sketch.
18) List and explain the different types of socket.
19) Explain the socket structure in detail
20) What is meant by socket? List and explain the different fields of socket.
21) Socket address structure in detail
22) Explain with a neat diagram IMAP4
23) Write a short note on Congestion control in TCP
24) Describe the Web based mail.
25) Explain in detail MIME concepts in Email.
26) Explain the connectionless iterative server (client and server)

27) Explain the concurrency client-server concept in detail, with a neat sketch.
28) What is client and Describe concurrency in client.

29 Write a short note on BOOTP.
30 Explain the different operations of BOOTP.
31 Explain in detail Mail transfer phase in SMTP.
32) Describe a) Big-Endian Byte order
b) Little-Endian Byte order
c) Byte order Transformation
33) Explain in detail a) Address Transformation
b) Memory management function
34) Explain the connection oriented concurrent server (client and server)
35) Write a short note on TFTP.
36) Write a short note on Post office Protocol (POP3)

37) Write a short note on Escape character in TELNET.
38) Write a short note on Out –of –Band signaling.
39) Write a short note on controlling the server.
40) Write a short note on DHCP.
41) What is DNS? Explain in detail.
42) What is name space? Explain the types of name space.
43) What is name space? Explain Distribution of Name Space in detail.
44) What is Resolution? Explain in the same in detail.
45) Describe the DHCP packet format with a neat diagram.
46) Explain in detail DNS Messages.
17) Explain in detail Types of Records in DNS.
48) Write a short note on TELNET
49) Describe about the TELNET Login phase.
50) Write a short note on Embedding.
51) Write a short note on Options in TELNET.
52) Write a short note on Sub option Negotiation.
53) Write a short on TFTP Data Transfer and connection.

6 marks

1) List and explain the different typical application of UDP.
2) What is segment? Explain in detail TCP segment format.
3) Explain the connection establishment in TCP connection using three way hands shaking.
4) Explain in detail different types of TFTP Messages.
5) What is TCP Timer? Describe the different types of TCP Timers.
6) Explain in detail the TCP packets with a neat sketch.
7) Explain the different services of SCTP.
8) Explain the services of user agents in E-mail.
9) List and explain the different Features of SCTP.
10) List and explain the different services of TCP.
11) Write a short note on Mode of Operations in TELNET.
12) Explain in detail about Network Virtual Terminal (NVT).
13) Describe Classfull addressing.
14) Describe special addressing.
15) Describe NAT(Network Address Translation).
16) What is fragmentation? Describe the fields related to fragmentation with n example.
17) Explain the Architecture of E-mail with Four different scenarios.
18) Explain in detail four levels of addressing in TCP/IP protocol suite.
19) What is byte ordering? Explain byte ordering functions in detail.
20) With a neat diagram explain the Message Access Agent (MAA) in POP and IMAP.
21) List and explain all the socket system calls.
22) Explain the socket interface for connectionless iterative server
23) Explain in detail Domain Name Space?
24) Explain the socket interface for connection oriented server.
25) Describe the types of DNS Messages in detail.
26) Explain SSH Components, Port Forwarding, Format of SSH packages.
27) Explain in detail Distribution of Name Space?
28) Explain in detail DNS in the internet?

Punyashlok Ahilyadevi Holkar Solapur University,Solapur

Department Of Computer Science And Engineering

Class :- T. Y. B. Tech. (CSE) Sem-I (New w.e.f. June 2020)
Subject : Design and Analysis of Algorithm

1.Write a algorithm for binary search using divide and conquer method.

2.Write an algorithm for finding maximum and minimum value from array .Prove that

T(n) =3n/2-2

3.Write an algorithm for merge sort and prove that

T(n)= O(nlogn)

4.Define an algorithm and explain its feature.

5.Explain time and space complexity

Define

1. Big O 2. Omega 3.Theta asymptomatic notation

6.What are different pseudo code notation.

7.Find out time complexity of following algorithm

```
Algorithm (a,b,c,m,n)
{
        for i  1 to m do
            for j 1 to n do
              c[I,j]= a[I,j]+b[I,j]
}
```

8.Explain multistage graph with example.

9.Explain TSP with example.

10.Explain all pair shortest path with example.

11. Explain job sequencing in detail with example.

12. Find an optimal solution to knapsack problem using greedy method. M=60, n=5 (p1……p5)={30,20,100,90,160} and (w1…….w5)={5,10,20,30,40}

13.Write an algorithm based on divide and conquer methodology to find Max and Min element. Simulate the algorithm on the following nine elements. 22, 13,-5,-8, 15, 60,17,31,47

14.Solve 0/1 Knapsack problem using dynamic programming. M=8, n=4 profit={1,2,5,6} and weight={2,3,4,5}

15.State and explain Graph coloring problem.

16.Write brief note on P, NP, NP -complete and NP – Hard problems.

17.Given W[1:6]={5,10,12,13,15,18), m=30 and n=6. Find all possible subsets of w that sum to m. draw the portion of the state space tree that is generated.

18.Using Greedy approach find maximum profit earned for the given knapsack problem. Profit = (12, 10, 8, 11, 14, 7, 9) Weight = (4, 6, 5, 7, 3, 1, 6) M = 18.

19.Sort following elements using Quick sort (Show each iteration). 65, 70, 75, 80, 85, 60, 55, 50, 45.

20.Write a note on – Reliability design.

21) Solve 0/1 Knapsack problem using Dynamic Programming N = 3, m = 6 Profit = {1, 2, 5} and weight = {2, 3, 4).

22) Draw portion of solution space tree for 4- Queen problem using backtracking.

23) Explain Hamilton cycle. 5) Define P, NP, NP-hard problem.

24) Explain optimal storage on tape with example.

25) Explain single source shortest path with example.

26) Explain Minimum –cost spanning trees – Prim's and Kruskal's Algorithms with example.

27) Explain Job Sequencing with deadlines with example.

28) Explain Optimal binary search trees with example.

29) Explain Flow shop scheduling with example.

30) Explain 8-queen problem with example.

31) explain Knapsack Problem with backtracking with example.

32) Explain following

1. P-class
2. NP class
3. NP-complete

4 NP-hard problem

P.A.H. Solapur University, Solapur
Subject: Theory of Computation
Class: S.Y. B. Tech Computer Science Engineering
Question Bank

1. Give a regular expression that represent the set of springs over $\sum = \{0,1\}^*$ that contain substring 01 and 10

2. Create a regular expression that generates the language over the alphabet {a, b} of all strings in which each b is preceded by at least one a.

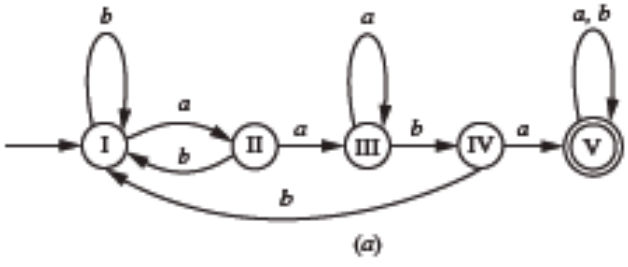
3. Create a regular expression that generates the language over the alphabet {a, b} of all strings containing an even number of bs.

4. Describe languages over the alphabet {0, 1} given by following the regular expression?
   a. (1+10+110)*
   b. (01+10)* +0(11+10)*
   c. (0+00)*(10)*

5. Define Deterministic Finite automata

6. Differentiate between DFA and NFA

7. Describe in English language or Regular expression language accepted by following FA



8. Define NFA

9. Define extended transition function for NFA with example

10. Compare NFA with DFA along with example

11. Define NFA - ^ with example

12. Compare NFA and NFA -^ along with example

13. Explain ^ closure for a set of states

14. Define Extended transition function for NFA-^

15. Define Grammar with example

16. In each case below, say what language (a subset of {a, b}∗) is generated by the context-free grammar with the indicated productions.
    a. S →aS | bS | ^
    b. S →SS | bS | a
    c. S →SaS | b
    d. S →SaS | b | ^
    e. S →T T , T → aT | T a | b
    f. S →aSa | bSb | aAb | bAa , A → aAa | bAb | a | b | ^
    g. S →aT | bT |^, T→aS | bS
    h. S →aT | bT T → aS | bS | ^

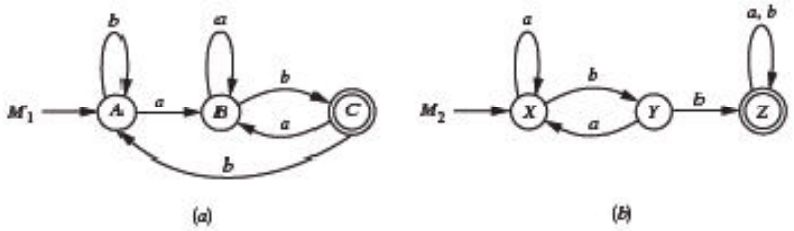
17. In each case below, find a CFG generating the given language.
    a. The set of odd-length strings in {a, b}∗ with middle symbol a.
    b. The set of even-length strings in {a, b}∗ with the two middle symbols equal.
    c. The set of odd-length strings in {a, b}∗ whose first, middle, and last symbols are all the same.

18. Define derivation trees and ambiguity with example

19. Draw a finite automaton for Regular expression for the given language = (0 + 1) *01

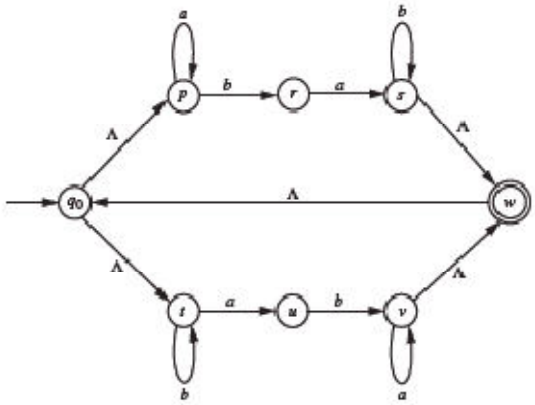
20. An FA accepting the strings containing the substring abbaab

21. Let M1 and M2 be the FAs pictured accepting languages L1 and L2, respectively.
    Draw FAs accepting the following languages.
    a. L1 ∪ L2
    b. L1 ∩ L2
    c. L1 – L2

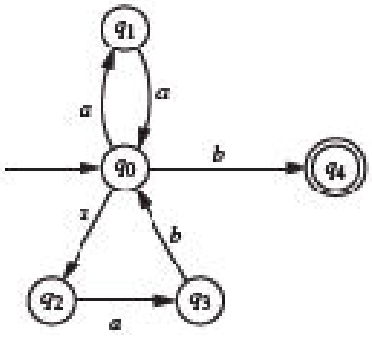


22. Explain Regular Language and regular expression

23. Define null closure and find ^{ q_0 } , ^{r,s}

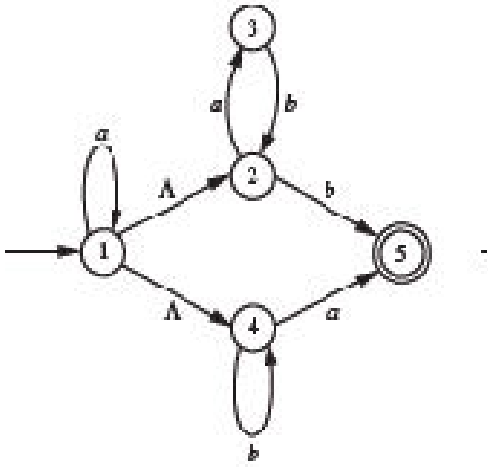


24. For the given NFA , check whether given following string accepted or not
    δ*(q_0 ,abab)
    δ* (q_0, abba)

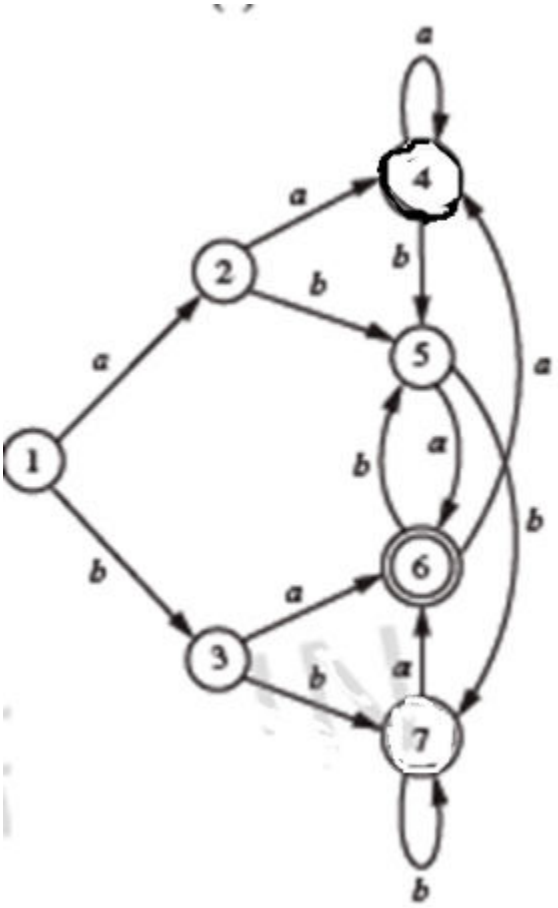


25. Construc an NFA-^ for the regular expression with Kleens theorem ((aa + b)∗(aba)∗bab)∗.

26. Convert given NFA-^ to NFA



27. Minimize the given Finite Automata



28. Show that the CFG with productions $S \rightarrow a \mid Sa \mid bSS \mid SSb \mid SbS$ is ambiguous

29. Convert the following grammar into Chomskey normal form

S → TU| V
T → aT b | ^
U → cU | ^
V → aV c | W
W → bW | ^

30. Write a CFG Corresponding to a Regular Expression bba(ab)∗ + (ab + ba∗b)∗ba

31. Design PDA for the language L={ $a^{2n}\, b^{3n}$ | n>0 }

32. Design PDA for the language L= { $a^m\, b^n\, c^{m+n}$ | n,m>0 }

33. Design PDA for palindrome over $\{a,b\}^*$

34. In each case below you are given a CFG and a string x that it generates for the top down PDA, trace the sequence of moves by which x is accepted showing at each step the corresponding leftmost derivation of x in the grammar.

a)S→S+S | S*S | (S) | a. where x=(a*a+a).
b)S→(S) S | Λ where x=( ) (( ) ( )).

35. In each case below you are given a CFG and a string x that generates for the non deterministic bottom up PDA. Trace a sequence of moves by which x is accepted, showing at each step the state, the stack contents, and the unread input. Show at the same time the corresponding rightmost derivation of x (in reverse order) in the grammar.

a) S→S[S] | Λ and x=[] [[] []].
b) S→[S]S | Λ and x=[] [[] []].

36. What is Pumping Lemma Thm? What is the use of it?

37. Prove that CFLs are closed not under intersection

38. Prove that CFLs are closed not under complementation

39. Prove that that language L={ a^n b^{2n} c^n | n>=0 }is not CFL using pumping lemma.

40. Prove that that language L={ a^n b^m a^n b^{m+n} | m>n, and m,n>=0 }is not CFL using pumping lemma.

41. Prove that that language L={ ww^r | w ∈{a,b}* }is not CFL using pumping lemma.

42. What is Turing machine? Explain with example.

43. Construct a Turing machine for L={ $(a\ b)^n$ c^n | n>=0 }.

44. Design TM for $\{a,b\}^*$aba.

45. Design a TM for palindrome over $\{a,b\}^*$.

46. Design TM to find 1's complement of the binary number

47. What is universal Turing Machine?

48. Explain Multi-tape Turing machine

49. Explain Non-deterministic Turing machine

50. Explain Multi-track Turing machine

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QUESTION BANK

Final Year B. Tech(E&TC) CBCS Sem II

Subject: CMOS VLSI Design

Short Questions of 4 marks each:

1) What is accumulation, depletion and enhancement mode of E MOSFET?
2) What are second order effects for E MOSFET? Explain any one of them.
3) What is dynamic power dissipation of CMOS inverter?
4) What is technology scaling for MOSFET?
5) What is short circuit power dissipation of CMOS inverter?
6) Draw circuit diagram and stick diagram for two input XOR gate
7) Draw circuit diagram and stick diagram for two input NAND gate
8) Which rules are followed for CMOS layout?
9) Draw circuit and layout for two input NOR gate
10) What are rules for drawing stick diagram?
11) What is complimentary CMOS logic? Design half adder using CMOS logic.
12) What is ratioed logic? Design two input XNOR gate using this logic.
13) Comment on delay of four input dynamic NAND gate.
14) Design two input OR/NOR gate using complimentary pass transistor logic.
15) What is charge sharing in dynamic logic and how it is overcome?
16) What is domino CMOS logic?
17) What is bistability principle? Draw and explain negative latch using transmission gates and inverters.
18) What is low voltage static latch?
19) What is master slave edge triggered register?
20) What is static SR latch?
21) What is C^2MOS master slave positive edge triggered register?
22) What is C^2MOS based dual edge triggered register?
23) Draw positive edge triggered register in TSPC and explain.
24) Explain Synchronous interconnect and Mesochronous interconnect
25) What are Plesiochronous interconnect?
26) Draw the structure of 4-bit binary adder and explain.
27) What is delay of ripple carry adder and delay of Carry skip adder?
28) Explain Array multiplier.
29) Draw and explain CMOS SRAM cell.
30) What is floating gate transistor? What is its application?

Long Questions of 6 marks each:

1) How to obtain DC characteristics of CMOS inverter? What is effect of Bn/Bp on this characteristic?
2) What is noise margin for CMOS inverter? How it is obtained from DC characteristics of CMOS inverter?
3) What are lambda based design rules for CMOS layout? Draw layout for two input NAND gate?
4) What is power dissipation of CMOS inverter? Derive necessary equations.
5) What are MOS device design equations? Explain with characteristics of MOSFET.
6) What is pseudo NMOS logic? Implement sum of full adder using this logic.
7) What are universal gates? How to design these gates using pass transistor logic?
8) What are limitations of dynamic CMOS logic? How to overcome them?
9) Compare static and dynamic CMOS designs.
10) What is clock skew and how to minimize clock skew?
11) What is clock jitter? How to reduce effect of clock jitter?
12) What are problems in using two phase clock for latches & registers? How to overcome this?
13) What is full adder? How to implement it using pass transistor logic?
14) What are fast multipliers? Explain one method.
15) What is ROM cell? How it is programmed?
16) What are different types of RAM cell? Explain any one in detail.
17) What are synchronizers? Explain in detail.
18) What are Arbiters and how they are implemented?
19) What is carry bypass adder?
20) Design full subtractor using CMOS logic.

Exam Questions Bank

Class: Final BTech(E&TC)-II **Subject: Industrial IoT**

Q. 1. Attempt any four questions. (4x4=16 Marks)

1. Define Industrial IoT? Explain Key IIoT Technologies.
2. Differentiate between the IoT and the I-IoT?.
3. Describe Industrial Internet Use-Cases in Healthcare.
4. Explain Industrial Internet Use-Cases in smart office.
5. Explain IoT key technologies.
6. Explain the Digital and Human Workforce.
7. Explain Catalysts and Precursors of the IIoT.
8. Explain key opportunities and benefits.
9. Explain IIC Industrial Internet Reference Architecture.
10. Explain Industrial Internet Architecture Framework (IIAF).
11. Explain gateways in IIoT.
12. Write short note on the following:
    a) Connectivity in IIS b) Key system characteristics c) Data Management
13. Describe network and system level potential security issues.
14. What is security in industrial internet
15. Write note on identity access management in IoT.

Q. 2. Attempt any two questions. (6x2=12 Marks)

1. Explain three-tier topology.
2. Explain any three wireless communication technologies used in IIoT.
3. Write note on any two low power WAN field:
   a) SigFox
   b) LoRaWAN
   c) Low Power Wi-Fi
   d) LTE category-M
4. Explain IoT enabling factors.
5. Describe the proximity network and WSN edge node.
6. Explain legacy industrial protocols and modern communication protocols.
7. Explain manufacturing of IoT- PLCs and DCS.
8. Explain proximity network communication protocols.
9. Explain how to design industrial internet system.

Q. 3. Attempt any four questions. (4x4=16 Marks)

1. Write steps for registering AWS account. What is function of AWS IoT core? Also mention the different key components of AWS.
2. Explain AWS analytics with different mechanism to process data.
3. With neat diagram explain basic flow diagram implemented by the GCP IoT.
4. Explain the concept of Google Cloud Bigtable.
5. What is OpenStack? Explain software/deployment architecture.
6. Write steps for registering AWS account. What is function of AWS IoT core?
7. Write short note on:
   a) Storing data b) QuickSight
8. Explain google cloud analytics.
9. Compare AWS and open stack.
10. Define identity service in open stack.
11. What are different model of deployment in cloud computing w.r.t. GCP?
12. Describe the security aspects that cloud offers.
13. What is Google Big query? What are benefits of big query?
14. List down the components of open stack compute.
15. What are edge location in IoT? Illustrate with an example.
16. What are different types of instances?

Q. 4. Attempt any two questions. (6x2=12 Marks)

1. Draw and explain AWS I-IoT architecture.
2. What are the main features of GCP? Mention the advantages of goggle cloud.
3. Explain any two open stack ecosystem core projects.
4. Define the following :
   a) Bare Metal
   b) Virtual Machine
   c) Containers
   d) Orchestration and configuration management
   e) Monitoring and metering, elasticity
5. What are various layer of cloud architecture in AWS.
6. What are libraries & tools used for cloud storage on GCP?
7. What is VPC? Explain with an example four types of VPC architecture.
8. Explain in brief modern architecture of open stack.
9. What are the benefits of API in cloud domain? Mention what the difference between elasticity & scalability in cloud are computing.

PAH Solapur University, Solapur
Sample Question Bank
Third Year B. Tech (Electronics) (w.e.f.June 2020) Sem-I May 2022
Open Elective I – Information Technology & Management

Note: The purpose of question bank is to give students the general idea of questions in final university examination only

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1. With suitable example elaborate data, database, information and knowledge
2. With suitable example describe - 'data leads to information, information leads to knowledge'. With suitable example show how this benefits to organization.
3. With significance for each, evaluate components of a typical information system
4. Evaluate a typical E Commerce framework
5. Compare : Brick and Mortar, Click and Mortar, Pure E Commerce
6. With suitable example compare - B2B Vs B2C
7. With suitable example present different model of E Commerce
8. With suitable example present different model of E Business
9. With suitable example justify – E Commerce is a subset of E Business
10. What are different models of E Payment popular in India?
11. Explain any two E Payment systems used in India
12. Justify major IT characteristics in digital economy
13. Show how information systems can be classified based on levels
14. With suitable example explain to whom IT supports in an enterprise
15. With suitable example evaluate a typical IT architecture
16. With suitable example describe different models for cloud computing
17. With suitable example describe grid computing
18. With suitable example describe service based architecture
19. Discuss advantages of E Commerce to organizations
20. What are the major mechanisms to conduct E Commerce
21. Differentiate with examples – forward auction Vs reverse auction
22. Explain mobile commerce and its applications
23. Justify with suitable example – modern organizations must adopt click and mortar model
24. Compare with similarities and differences – database, data warehouse, data mart
25. With suitable example differentiate between centralized and distributed databases. Also what are the advantages and disadvantages of each?
26. Discuss need, scope, functions and challenges for DBMS

27. Bank of ABC has 2000 operational branches in India. Justify need of database management for the bank.
28. Evaluate major capabilities of information systems
29. Comment on - business analytics improves the profit of an organization
30. Comment on - use of ERP improves business / organization performance
31. Comment on - use of DSS improves business / organization performance
32. Comment on - use of SCM improves business / organization performance
33. What are the different processes and flows in a typical supply chain? How it can be digitized?
34. With suitable example describe how ERP system can be integrated with E Supply Chain Management to reap more benefits
35. What are the various costs associated with adopting ERP? How those can be justified?
36. With suitable example discriminate – data worker and knowledge worker
37. With suitable example describe verious steps in deciding the IT architecture
38. Justify need of E Government practices in the country like India
39. Justify with example – many ethical issues are associated with E Commerce
40. Justify with example – many legal issues are associated with E Commerce
41. Justify with suitable example – ECM is a necessary practice for modern government offices
42. Justify with suitable example - all modern organizations must adopt click and mortar model
1. Justify with suitable example – modern organizations and information systems influence each other
2. Justify with suitable example – IT flattens organization
43. With suitable example explain modern sustainable engineering practices
44. Comment on sustainable engineering practices of 21st century
45. Comment on attributes of software project
46. Comment on when to use and when to not use Waterfall model for software project
47. With suitable example evaluate need of software project management
48. Discuss different processes in a typical SDLC
49. Justify with example – success of software project largely attributes to project management
50. Put your view – IT is a necessary evil
51. Put your view – we require a clear policy and law for E Waste treatment
52. Put your view – is patent protection an ethical issue or legal issue?
53. With suitable example explain various practices adopted for green IT
54. With suitable example explain various types covered under IPR

55. XYZ Apparels is a renowned clothing company famous for denim garments. With suitable justification evaluate various information systems that can be used for strategic support in XYZ Apparels
56. Put your view – Software projects are different than other engineering projects
57. Put your view – Software projects are equally challenging as other engineering projects
58. Comment on de-skilling and alienation
59. Put your view – telecommuting practices helped organizations in Covid-19 epidemic
60. Comment on –workplace behavior and health issues related to IT practices in organizations

Question Bank

Subject: Switchgear & Protection

CBCS (w.e.f. – June 2021)

Class: Final Year B.Tech (Electrical) Sem-I

A. Four Mark Questions

1. What are desirable qualities of protective scheme?
2. What do you mean by zones of protection? Explain primary and backup protection.
3. What are the advantages of static relay over electromagnetic relay?
4. Explain static overcurrent relay with neat diagram.
5. Explain construction and operation of directional overcurrent relay.
6. Explain microprocessor based relay with block diagram.
7. What different types of fuse? Explain construction and operation of HRC fuse with neat diagram.
8. What are the factors affecting for selection of fuse?
9. Explain the following terms
10. Fuse element b) Fusing factor c) Arcing and pre arcing time
11. Cut-off current e) Rupturing current.
12. Draw typical Time-PSM curve and explain it in brief.
13. Define the following.
    a) Pick up current b) Current Setting
    c) Plug setting Multiplier d) Time setting multiplier
14. Explain various types of static overcurrent relay with block diagram.
15. Discuss the overcurrent protective scheme for radial and ring main feeder.
16. Discuss the protective scheme for earth fault and phase fault.
17. Explain microprocessor based overcurrent relay with block diagram.
18. Explain simple differential relay with neat diagram.
19. Explain percentage differential relay with neat diagram.
20. Describe microprocessor based mho & offset mho relay with block diagram and flow chart to realize its characteristics.

21. Describe microprocessor based impedance relay with block diagram and flow chart to realize its characteristics.
22. Describe microprocessor based reactance relay with block diagram and flow chart to realize its characteristics.
23. Derive an expression for a generalized mathematical equations for the operating conditions of mho & offset mho and impedance relay.
24. Explain differential protection scheme used for transformer.
25. With neat sketch explain over fluxing protection used for transformer.
26. With neat sketch explain percentage differential protection scheme for generator
27. Explain protection of generator against motoring action.
28. Explain protection against overheating due to unbalanced three phase stator current.
29. Explain restricted earth fault protection scheme used for generator
30. Explain protection of generator against excitation failure with neat diagram.
31. Explain high resistance interruption method of arc.
32. Explain current zero interruption method of arc.
33. Define the following in case of circuit breaker.
    a) Restriking voltage. b) Recovery voltage.
34. What is resistance switching? Derive an expression for critical resistance in terms of system inductance, capacitance.
35. With neat sketch explain construction & operation of air blast circuit breaker with their types.
36. With suitable diagram explain construction & operation of vacuum circuit breaker.
37. Explain construction and operation of minimum oil circuit breaker with neat diagram.
38. Explain various ratings of high voltage circuit breaker. Discuss symmetrical and asymmetrical breaking capacity and making capacity, short time current rating.
39. With neat sketch explain metal oxide Zno arrestors.
40. Write a short note on insulation coordination in power system.
41. What are the causes of over voltages in power system?
42. With a neat sketch explain different types of lightning arrestors.
43. Explain Ferranti type surge absorber with neat diagram.
44. With neat sketch explain construction & operation of thyrite type lightning arrestor.

B. Six Mark Questions

1. With a neat sketch explain electromagnetic attraction relay.
2. Explain how admittance relay is used for distance protection? Draw its characteristics on R-X diagram.
3. With a neat sketch explain theory & construction of induction disc relay.
4. With a neat sketch explain theory & construction of induction cup relay.
5. Derive torque equation for induction relay and explain its significance.
6. With a neat sketch explain electromagnetic induction relay.
7. Describe microprocessor based mho & offset mho relay with block diagram.
8. Explain protection of induction motor for different faults.
9. Explain construction, principle and operation of oil circuit breaker with neat diagram.
10. Explain the phenomenon of current chopping in circuit breaker.
11. Explain how impedance relay is used for distance protection? Draw its characteristics on R-X diagram.
12. Determine the time of operation of an IDMT relay rating 4 and having setting of 120% and TSM=0.6.The relay is connected through C.T. of 400/5A. The fault current is 3000A.The operating time for PSM of 6.25 is 2.8 Second.
13. Explain how reactance relay is used for distance protection? Draw its characteristics on R-X diagram.
14. Explain differential protection of bus bar with neat diagram.
15. With suitable diagram explain construction & operation of SF6 circuit breaker. Also state its advantages and disadvantages.
16. Explain the phenomenon of capacitive current interruption in circuit breaker with suitable waveforms.
17. Explain differential protection scheme used for transformer.
18. Explain protection of induction motor for different faults.
19. Explain construction, principle and operation of oil circuit breaker with neat diagram.
20. Explain the phenomenon of current chopping in circuit breaker
21. Briefly describe miniature circuit breaker and moduled case circuit breaker with neat diagram.
22. Explain different methods of testing of circuit breaker also discuss their merits and demerits.
23. Explain HVDC circuit breaker with neat diagram.
24. Explain the phenomenon of capacitive current interruption with suitable waveforms.
25. Derive an expression of Restriking voltage & RRRV in terms of system voltage, inductance and capacitance.

Applied Mathematics-I (I.T SEM-I 2021)

Question Bank

Que. No.	Question
01	Solve $(D^2-5D+6)y=\sin 3x.$
02	Solve $(D^3-3D^2+9D-27)y=\cos 3x.$
03	Solve $(D^4+8D^2+16)y=\cos^2 x$
04	Solve $(D^4+6D^2+9)y=96\sin 2x.\cos x.$
05	Solve $(D^4+5D^2+4)y=\cos(x/2).\cos(3x/2).$
06	Solve $(D^2-2D+1)y=e^x\sin x.$
07	Solve $(D^2-1)y=e^x\cos x.$
08	Solve $(D^2+3D+2)y=e^{2x}\sin x.$
09	Solve $(D^2-4D+1)y=e^{2x}\sin 2x.$
10	Solve $(D^2-4D+4)y=e^{2x}x^2.$
11	Solve $(D^2-4D+4)y=x^3+e^{2x}+\cos 2x.$
12	Solve $(D^3-2D^2+D)y=x^2+x.$
13	Solve $(D^2+D-2)y=1+x-x^2.$
14	Solve $(D^3-D)y=2e^x+2x+1-4\cos x.$
15	Solve $(D^2+5D+4)y=3-2x.$
16	Solve $(D^2+a^2)y=cosec\,ax.$
17	Solve $(D^2+3D+2)y=\sin(e^x).$
18	Solve $(D^2-3D+2)y=\sin(e^{-x}).$
19	Solve $(D^2-1)y=e^{-x}\sin(e^{-x})+\cos(e^{-x}).$
20	Solve $(D^2-4D+4)y=8.x^2e^{2x}\sin 2x.$
21	Find $L\{te^{-4t}\sin 3t\}$
22	Find $L\{t^2e^{-t}\sin 4t\}$
23	Find $L\{te^t\sin^2 3t\}$
24	Find $L\{t^2\sin 3t\}$
25	Find $L\{t\cos^3 t\}$
26	Evaluate $\int_0^\infty \frac{e^{-at}-e^{-bt}}{t}dt$
27	Evaluate $\int_0^\infty e^{-t}\left(\frac{\cos 3t-\cos 2t}{t}\right)dt$
28	Evaluate $\int_0^\infty e^{-2t}\left(\frac{\sin^2 2t}{t}\right)dt$
29	Evaluate $\int_0^\infty e^{-t}\left(\frac{sint}{t}\right)dt$
30	Evaluate $\int_0^\infty e^{-t}\left(\frac{\sin 3t+\sin 2t}{t}\right)dt$
31	Find inverse Laplace transform of $\frac{1}{(s-2)(s+2)^2}$
32	Find inverse Laplace transform of $\frac{4s+5}{(s-1)^2(s+2)}$
33	Find inverse Laplace transform of $\frac{2s+3}{(s+1)^2(s+2)}$
34	Find inverse Laplace transform of $\frac{s}{(s-3)(s^2+4)}$

35	Find inverse Laplace transform of $\frac{s^2}{(s^2+1)(s^2+4)}$
36	Calculate inverse Laplace transform of $\frac{1}{2}\log\left(\frac{s-1}{s+1}\right)$
37	Calculate inverse Laplace transform of $\log\left(1+\frac{1}{s^2}\right)$
38	Calculate inverse Laplace transform of $\frac{1}{2}\log\left(1-\frac{a^2}{s^2}\right)$
39	Calculate inverse Laplace transform of $\log\left(\frac{s^2+1}{s(s+1)}\right)$
40	Calculate inverse Laplace transform of $\log\left(\sqrt{1+\frac{4}{s^2}}\right)$
41	Solve $(D¿¿2+3D+2)y=2(t^2+t+1)¿$ with $y(0)=2$ and $y'(0)=0$.

42	Solve $(D¿¿2+4D+8)y=1¿$ with $y(0)=0$ and $y'(0)=0$.
43	Solve $(D^3-2D¿¿2+5D)y=0¿$ with $y(0)=2$ and $y'(0)=0, y''(0)$.
44	Solve $(D¿¿2+4D+13)y=e^{-t}sint¿$ with $y(0)=0$ and $y'(0)=0$.
45	Solve the following equation by using Laplace Transform $\frac{dy}{dx}+2y+\int_0^t y\,dt=sint$, given that $y(0)=1$.
46	Find $Z[f(k)]$, where $f(k)=k3^k, k\geq 0$
47	Find $Z[f(k)]$, where $f(k)=k5^k, k\geq 0$
48	Find $Z[f(k)]$, where $f(k)=ka^k, k\geq 0$
49	Find Z-Transform of $k^2e^{-ak}, k\geq 0$
50	Find Z-Transform of $k^2e^{k-1}, k\geq 0$
51	Find $Z[f(k)]$, where $f(k)=3^k, k\geq 0$
52	Find $Z[f(k)]$, where $f(k)=4^k, k\geq 0$
53	Find $Z[f(k)]$, where $f(k)=\left(\frac{1}{6}\right)^k, k\geq 0$
54	Find $Z[f(k)]$, where $f(k)=\left(\frac{1}{3}\right)^k, k<0$
55	Find $Z[f(k)]$, where $f(k)=\begin{cases}3^k, & k<0\\ 2^k, & k\geq 0\end{cases}$
56	Find inverse Z-Transform of $F(z)=\frac{z^3}{(z-1)(z-2)^2}$, if ROC $\lvert z\rvert>2$
57	Find inverse Z-Transform of $F(z)=\frac{z^3}{(z-3)(z-2)^2}$, if ROC $\lvert z\rvert>3$
58	Find inverse Z-Transform of $F(z)=\frac{z}{\left(z-\frac{1}{4}\right)\left(z-\frac{1}{5}\right)}$, if ROC is $\frac{1}{5}<\lvert z\rvert<\frac{1}{4}$
59	Find inverse Z-Transform of $F(z)=\frac{z}{(z-2)(z-3)}$, if ROC is $\lvert z\rvert<2, 2<\lvert z\rvert<3, \lvert z\rvert>3$
60	Find inverse Z-Transform of $F(z)=\frac{1}{\left(z-\frac{1}{2}\right)\left(z-\frac{1}{3}\right)}$, if ROC is $\frac{1}{3}<\lvert z\rvert<\frac{1}{2}, \frac{1}{2}<\lvert z\rvert$
61	Find inverse Z-Transform of $F(z)=\frac{1}{(z-1)^2}$ when $\lvert z\rvert<1, \lvert z\rvert>1$
62	Find inverse Z-Transform of $F(z)=\frac{1}{(z-5)^2}$ when $\lvert z\rvert<5, \lvert z\rvert>5$
63	Find inverse Z-Transform of $F(z)=\frac{1}{(z-3)^2}$ when $\lvert z\rvert<3, \lvert z\rvert>3$
64	Find inverse Z-Transform of $F(z)=\frac{1}{(z-a)^2}$ when $\lvert z\rvert<a, \lvert z\rvert>a$
65	Find inverse Z-Transform of $F(z)=\frac{1}{(z-1)^3}$ when $\lvert z\rvert<1, \lvert z\rvert>1$
66	Obtain the Fourier series of $f(x)=\lvert x\rvert, -\pi\leq x\leq\pi$
67	Obtain the Fourier series of, $f(x)=e^{ax}$ in $(-\pi,\pi)$.
68	Obtain the Fourier series of, $f(x)=\begin{cases}x-\pi, & -\pi<x<0\\ \pi-x, & 0<x<\pi\end{cases}$
69	Obtain the Fourier series of, $f(x)=\sin ax, -\pi<x<\pi$.
70	Obtain the Fourier series of, $f(x)=x^3$, in $(-\pi,\pi)$

71	Obtain half range cosine series of $f(x)=\begin{cases}1, & 0<x<(a/2)\\ -1, & (a/2)<x<a\end{cases}$
72	Obtain half range cosine series of $f(x)=\begin{cases}1, & 0\le x\le 1\\ x, & 1\le x<2\end{cases}$
73	Obtain half range cosine series of $f(x)=(x-1)^2$ in $0\le x\le 1$
74	Obtain half range cosine series of $f(x)=x$ in $0<x<2$
75	Obtain half range cosine series of $f(x)=\sin\left(\frac{\pi x}{l}\right)$ in $(0,l)$.
76	Obtain the Fourier expansion of, $f(x)=\frac{a}{2}-x, 0<x<a$
77	Obtain the Fourier expansion of, $f(x)=2-\frac{x^2}{2}$ in $0\le x\le 2$
78	Obtain the Fourier expansion of, $f(x)=4-x^2$ in $0\le x\le 2$
79	Obtain the Fourier expansion of, $f(x)=\begin{cases}x, & 0<x<c/2\\ c-x, & c/2<x<c\end{cases}$
80	Obtain the Fourier expansion of, $f(x)=x^2$ in $(0,a)$
81	Obtain the Fourier series of, $f(x)=x^2$, in $(0,2\pi)$ and hence deduce that $\frac{\pi^2}{12}=\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+\ldots$
82	Obtain the Fourier series of, $f(x)=\begin{cases}\sin x, & 0\le x\le\pi\\ 0, & \pi\le x\le 2\pi\end{cases}$ Hence, deduce that $\frac{1}{2}=\frac{1}{1\cdot 3}+\frac{1}{3\cdot 5}+\frac{1}{5\cdot 7}+\ldots.$
83	Obtain the Fourier series of, $f(x)=\begin{cases}a, & 0<x<\pi\\ -a, & \pi<x<2\pi\end{cases}$. Hence, deduce that $\frac{\pi}{4}=1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\ldots$
84	Obtain the Fourier series of, $f(x)=e^{-x}, 0<x<2\pi$ and $f(x+2p)=f(x)$. Hence deduce the value of $\sum_{n=2}^{\infty}$ ❑¿¿
85	Obtain the Fourier series of, $f(x)=\frac{1}{2}(\pi-x)$ in $(0,2\pi)$ and hence deduce that $\frac{\pi}{4}=1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\ldots.$
86	Calculate the expected number of families having 0 boys, 1 boy, 2 boys, ... 5 boys, assuming

	boys and girls are equally likely. Out of 320 families with 5 children each.
87	Calculate on how many days in a course of 100 days out of 5 students of this class at least 4 will be present. On an average a student is present on 5 days a week.
88	Calculate the expected number of tosses showing (i) one and only one heads (ii) no heads (i) all heads, if six fair coins are tossed simultaneously. If 192 such tosses are made.
89	Calculate out of 1000 samples how many samples would you expect to contain at least three defectives? If in a sampling of a large number of parts produced by a machine, the mean number of defectives in a sample of 20 is 2.
90	Calculate how many would you expect to have (i) 3 boys, (ii) 5 girls, Out of 800 families with 5 children each.
91	Calculate the value of k if the following functions is a probability density function. $f(x)=\begin{cases} kx^2(1-x^3), 0\le x\le 1 \\ 0, otherwise \end{cases}$
92	Calculate the value of k if the following functions is a probability density function. $f(x)=k\left(\frac{1}{1+x^2}\right), -\infty<x<\infty$
93	Calculate the value of k if the following functions is a probability density function. $f(x)=\begin{cases} kx, 0\le x\le 2 \\ 2k, 2\le x\le 3 \\ 5k-kx, 3\le x\le 4 \\ 0, otherwise \end{cases}$
94	Calculate the value of k if the following functions is a probability density function. $f(x)=\begin{cases} k(x-1)^3, 1\le x\le 3 \\ 0, otherwise \end{cases}$
95	Find the value of k if each of the following function is a probability function $f(x)=kx^4e^{\frac{-x}{2}}; 0\le x\le\infty$
96	Determine the probability that a student selected at random will have weight (i) less than 45 kilograms (ii) between 45 and 60 kilograms, if the weights of 4000 students are found to be normally distributed with mean 50 kilograms and standard deviation 5 kilograms. (For a standard normal variate z, area under the curve between z = 0 and z= 1 is 0.3413 and that between z= 0 and 2 = 2 is 0.4772)
97	Determine the probability that an item selected at random will have size between (1) 18 cms and 23 cms. (ii) above 26 cms. If the sizes of 10,000 items are normally distributed with mean 20 cms and standard deviation 4 cms. (Given: For a S.N.V. z area from z = 0 to z = 0-5 is 0-1915, that from z = 0 to z = 0.75 is 0.2734 and that from z = 0 to z 1.5 is 0.4332)
98	Determine the proportion of accounts (i) over Rs. 150, (ii) between Rs. Rs. 100 and Rs. 150, (iii) between Rs. 60 and Rs. 90. If the customer accounts of a certain departmental store have an average balance of Rs. 120 and a standard deviation of Rs. 40. Assuming that the distribution of account balances is normal. (Given For S.N.V. z area from z = 0 to z = 0.75 is 0.2734, that from z = 0 to z = 0.5 is 0-1915 and that from z = 0 to z = 1.5 is 0-4332).
99	Calculate how many items out of 500 lies between 38 and 62 and also between 26 and 74. If the mean and standard deviation of a normal distribution are 50 and 12. (Given: For S.N.V. z area from z = 0 to z = 1 is 0.34135 and that from z = 1 to z = 2 is 0-1359)
100	Calculate what is the number of persons of this group who have income (i) exceeding Rs. 6680,

(ii) exceeding Rs. 8320? If the income distribution of a group of 10,000 persons was found to be normal with mean Rs. 7500 and standard deviation Rs. 500.
(Given: Area under the standard normal curve between ordinates ± 1.64 is 0-8990.)

101 Calculate the co-efficient of correlation between export raw material and import of finished goods from the following data

Export of raw material in corers of Rs.	42	44	58	55	89	98	66
Imports of finished goods in corers of Rs.	56	59	53	58	65	78	58

102 Calculate from the following values of the demand and the corresponding price of a commodity, the degree of correlation between the demand and price by computing Karl Pearson's coefficient of correlation.

Demand in quintals	65	66	67	67	68	69	70	72
Price in Paise per Kg	67	68	65	68	72	72	69	71

103 Calculate the co-efficient of correlation for the prices (in Rs.) and sales units.

Prices in Rs.	100	98	85	92	90	84	88	90	93	95
Sales Units	500	610	700	630	670	800	800	750	700	690

104 Calculate the co-efficient of correlation from the following figures.
Is there any marked correlation between the production and price of tea?

Production in corers of lbs.	34	27	31	38	38	36	39	40
Price in Rs. per lb.	3.75	4.62	4.25	4.12	4.28	4.32	4.21	4.05

105 Compute the co-efficient of correlation between X and Y from their values given below.

x	30	33	25	10	33	75	40	85	90	95	65	55
y	68	65	80	85	70	30	55	18	15	10	35	45

106 Fit a Poisson's distribution to the following data:

X	0	1	2	3	4	Total
f	192	100	24	3	1	320

107 Fit a Poisson's distribution to the following data:

x	0	1	2	3	4	Total
f	112	63	20	4	1	200

108 Fit a Poisson's distribution to the following data:

x	0	1	2	3	4	Total

f	109	65	22	3	1	200

109 Four coins were tossed 160 times and the following results were obtained,
No. of heads, 0, 1, 2, 3, 4
Frequency, 17, 52, 54, 31, 6
Fit a Binomial distribution.

110 Fit a Binomial distribution to the following data,

Value of x	0	1	2	3	4	5	6
Frequency f	6	20	28	12	8	6	0

111 Calculate the two lines of regression and estimate the weight of the student of height 59 inches. The following data give the heights in inches (x) and the weights in lbs. (y) of random sample of 10 students from a large group of students of age 17 years.

x	61	68	68	64	65	70	63	62	64	77
y	112	123	130	115	110	125	100	113	116	126

112 Calculate Karl Pearson's co-efficient of correlation and the equations of the lines of regression from the following data.

Age of husband	18	19	20	21	22	23	24	25	26	27
Age of wife	17	17	18	18	18	19	19	20	21	22

Estimate age of wife when that of husband is 30 and age of husband when that of wife is 25.

113 Calculate the equations of the lines of regression from the following data. Find also the best estimate of y when x = 13 and the best estimate of x when y = 8.

x	2	4	6	8	12	14
y	4	2	5	10	11	12

114 Calculate the regression line of sales on test scores and estimate the most probable weekly sales if a salesman makes a score of 70. The following table records the test scores made by a salesman on an intelligence test and their weekly sales.

Salesman	1	2	3	4	5	6	7	8	9	10
Test scores	40	70	50	60	80	50	90	40	60	60
Sales (000 Rs.)	2.5	6.0	4.5	5.0	4.5	2.0	5.5	3.0	4.5	3.0

115 Calculate the regression equation of germination interval on mean soil temperature and of temperature on germination interval. From the following data obtain the two lines of regression.

Sales (in lakhs)	91	97	108	121	67	124	51	73	111	57
Purchases (in lakhs)	71	75	69	97	70	91	39	61	80	47

116	With usual notation find the average waiting time per customer in the queue and in the system for $M/M/1/\infty$ model, if $\lambda=8 \wedge \mu=15$ per hour.
117	With usual notation find the average waiting time per customer in the queue and in the system for $M/M/1/\infty$ model, if $\lambda=9 \wedge \mu=15$ per hour.
118	Find the probability that a customer has to wait in an $M/M/1/\infty$ in which $\lambda=8 \wedge \mu=10$ *per hour*.
119	What is the probability that in an $M/M/1/\infty$ system, with 6 persons arriving per hour and 8 persons being served per hour, there will be more than 8 persons in the system?
120	Find the probability that a customer has to wait more than 20 minutes to be out of the service station with $\lambda=8$ per hour and $\mu=11$ per hour, if the system is $M/M/1/\infty$.
121	A super market has two girls serving at the two counters. The customers arrive in Poisson fashion at the rate of 12 per hour. The service time for each customer is exponential with mean 6 minutes. Find i) the probability that an arriving customer has to wait. ii) the average number of customers in the system. iii) the average time spent by a customer in the super market.
122	There are three computers in a shop and three operators. Each operator on an average can send 10 messages per hour by E-mail. If messages arrive for being E-mailed at the rate of 25 per hour, i) What is the probability that all the computers are busy? ii) What is the average number of messages waiting to be sent? iii) What is the average time a customer has to wait for waiting and for E-mailing his message?
123	In an infinite capacity queueing system with Poisson model with three servers and $\frac{\lambda}{\mu}=2$, find P_0.
124	In an infinite capacity queueing system with Poisson model with three servers and $\frac{\lambda}{\mu}=2.5$, and $P_0=\frac{1}{22.5}$, find the average number of customers in the queue and in the system.
125	There are two typiest in a type writing shop. Each typiest can type on an average 5 letters per hour. The rate of arrivals of letters in 8 per hour. i) What is the probability that both the typists are busy? ii) What is the average idle time foe which both typiest are idle?
126	An airport has a capacity for landing 80 places in good weather and 40 planes in bad weather per hour. The mean arrive rate is 30 planes per hour which is a Poisson process. When there is congestion, the planes are forced to fly over the field at different altitudes awaiting the landing of the planes that had arrive earlier. i) Find the number of planes that would be flying over the field on an average in good weather and in bad weather. ii) Find the interval for which a plane would be flying over the field and in the process of landing in good weather and bad weather. iii) How much flying over time and landing time can be allowed if the priority to land out of the order will have to be requested only in 1 in 25 times.
127	People arrive to purchase railway tickets at the rate of 5 per minute. On an average it takes 10 seconds to issue the ticket. A person arrives 5 minutes before the train starts. It takes 4 minutes for him to get the train after purchasing the ticket. i) Can he be expected in the train before the train starts? ii) What is the probability that he will be in the train before the train starts? iii) How early must he arrive at the railway station so that the probability of his being in the train before it starts is 99%?

128	The customer arrives at a reservation counter of a railway station according to Poisson process at the rate of 8 persons per hour. The time required to issue the reservation tickets fallows an exponential distribution with the mean of 6 minutes per person. Find the probability that a customer i) has to wait on arrival ii) finds 4 persons in the queue iii) has to spend 15 minutes in the railway station iv) average waiting time in the railway station v) average number of persons in the railway station.
129	An xerox machine owner earns by giving xeroxing service. The time required to complete xeorxing of one customer has an exponential distribution with mean of 5 minutes. The arrival of customers is a Poisson process with mean rate of 6 customers an hour. If the machine owner works 8 hours a day, find i) the percentage idle time ii) the average time a customer has to remain in the shop. iii) the average number of customers in the queue. iv) the probability that there will be more than 4 customers in the shop.
130	People arrive at the telephone booth at the rate of 20 per hour in a Poisson process. The time of a call per person is an exponential random variable with the mean of 2 minutes. Find the probability that a person on arrival at the booth will find atleast 4 persons in the system.

COMPUTER NETWORKS

QUETIONARY

4 Marks Questions

1. Compare OSI reference model with TCP/IP protocol suite.
2. Explain logical address in detail.
3. Explain Physical address in detail.
4. Explain Post address and Application specific address in detail.
5. Describe the NAT.
6. Write a short note on user datagram
7. Explain encapsulation & decapsulation in UDP with diagram
8. Write a short note on “Queuing” in UDP
9. Explain TCP services.
10. Explain TCP features.
11. Explain different types of TCP timers.
12. Write a short note on Concurrency.
13. Write a short note on Socket System Call
14. Explain simplified version of socket structure in detail.
15. Describe DHCP and explain need of DHCP.
16. What is Resolution in DNS?
17. Explain NVT with diagram
18. What is MTA? Explain formal protocol which defines the MTA client and server in the
19. Write a short note on Out-of-band signaling
20. Explain the messages used in TFTP.
21. Explain Dynamic Web Document.
22. Explain POP3 with its modes.

23. Explain need for DN
24. S also explain DNS in the Internet with suitable example.
25. Write a short note on Error control in TCP
26. Write a short note on Flow control in TCP
27. Write a short note on Congestion Control in TCP
28. Explain each and every module of UDP package in detail.
29. Describe the Classless Addressing.
30. Describe the Special Addressing.
31. Explain Post address and Application specific address in detail.

8 Marks Questions

1. Explain layers in TCP/IP protocol suite in detail with neat diagram.
2. Explain layers in OSI reference model in detail with neat diagram.
3. What is Three-way handshaking in TCP?
4. Draw State Transition diagram of TCP in detail.
5. Explain Connection–Oriented concurrent server in detail.
6. Explain Connectionless Iterative server in detail.
7. What is FTP? Explain connection in FTP.
8. Explain different domain name space sections of DNS in the internet.
9. Explain client state transition diagram of DHCP.
10. Explain Email architecture with its four scenarios.
11. Explain address allocation in DHCP. Draw DHCP client State transition diagram.
12. Explain connection in TFTP.
13. Explain need for DNS also explain DNS in the Internet with suitable example.

14. What is IP Datagram? Explain with a neat diagram.
15. What is fragmentation? Explain with a neat diagram.
16. Explain in detail pseudo header for checksum calculation with a neat diagram.
17. Explain the connection establishment in TCP connection using three way hands shaking.
18. Explain the different Associations of SCTP.
19. Explain the state transition diagram of SCTP in detail.
20. Write a TCP client-server Program.

P.A.H. Solapur University, Solapur
Subject: Discrete Mathematical Structures
Class: S.Y. B. Tech Computer Science Engineering
Question Bank

1. Construct the truth table for the following formulas
   a. $(\neg P \wedge (\neg Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R)$
   b. $(P \wedge Q) \vee (\neg P \wedge Q) \vee (P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

2. Given the truth values of P and Q as T and those of R and S as F, find the truth values of the following
   a. $(\neg (P \wedge Q) \vee \neg R) \vee (((\neg P \wedge Q) \vee \neg R) \wedge S)$
   b. $((\neg P \wedge Q) \vee \neg R) \vee ((Q \leftrightarrow \neg P) \rightarrow (R \vee \neg S))$

3. From the formulas given below select those which are well-formed and indicate which ones are tautologies and contradictions
   a. $((P \rightarrow (Q \rightarrow R)) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R)))$
   b. $((\neg P \rightarrow Q) \rightarrow (Q \rightarrow P)))$

4. Produce the substitution instances of the following formulas for the given substitutions
   a. $(((P \rightarrow Q) \rightarrow P) \rightarrow P)$; substitute $(P \rightarrow Q)$ for P and $((P \wedge Q) \rightarrow R)$ for Q
   b. $((P \rightarrow Q) \rightarrow (Q \rightarrow P))$; substitute Q for P and $(P \wedge \neg P)$ for Q

5. Express $P \rightarrow (\neg P \rightarrow Q)$ in terms of $\uparrow$ only. Express the same formula in terms of $\downarrow$ only.

6. Write a formula which is equivalent to the formula $P \wedge (Q \leftrightarrow R)$ and contains the connective NAND only. Obtain as equivalent formula which contain the connective NOR only.

7. Obtain the PCNF and PDNF of the following formulas. Which of the following formulas are tautologies?
   a. $P \vee (\neg P \rightarrow (Q \vee (\neg Q \rightarrow R)))$
   b. $(P \rightarrow (Q \wedge R)) \wedge (\neg P \rightarrow (\neg Q \wedge \neg R))$
   c. $P \rightarrow (P \wedge (Q \rightarrow P))$

8. Write the following formulas in prefix and suffix form. The following precedence is assumed: $\leftrightarrow$, $\rightarrow$, $\vee$, $\wedge$, $\neg$ ($\neg$ having the highest precedence)
    d. $P \wedge \neg R \rightarrow Q \leftrightarrow P \wedge Q$
    e. $\neg\neg P \vee Q \wedge R \vee \neg Q$

9. Convert the following prefix and suffix formulas into completely parenthesized form. Also write then in an infix form using the above order of precedence to minimize the number of parentheses.
    a. $\rightarrow \neg P \vee Q \leftrightarrow R \neg S$
    b. $\rightarrow \rightarrow P Q \rightarrow \rightarrow Q R \rightarrow P R$

10. Show the validity of the following arguments for which the premises are given on the left and conclusion on right.
    a. $(P \wedge Q) \rightarrow R, \neg R \vee S, \neg S$ $\neg P \vee \neg Q$
    b. $P \rightarrow Q, Q \rightarrow \neg R, R, P \vee (J \wedge S)$ J S
    c. $B \wedge C, (B \leftrightarrow C) \rightarrow (H \vee G)$ $G \vee H$

11. Derive the following using CP rule
    a. $\neg P \vee Q, \neg Q \vee R, R \rightarrow S \Rightarrow P \rightarrow S$
    b. $P, P \rightarrow (Q \rightarrow (R \wedge S)) \Rightarrow Q \rightarrow S$

12. Show that following premises are inconsistent
    a. $P \rightarrow Q, P \rightarrow R, Q \rightarrow \neg R, P$
    b. $A \rightarrow (B \rightarrow C), D \rightarrow (B \wedge \neg C), A \wedge D$

13. Given S = {a1, a2, a3, a4, a5, a6, a7, a8}, what subsets are represented by B_{17}, B_{31}? Also how will you designate the subsets {a2, a6, a7} and {a1, a8}

14. Given A = {x | x is an integer and $1 \leq x \leq 5$}, B = {3, 4, 5, 17} and C = {1, 2, 3,…}, find $A \cap B$, $A \cap C$, $A \cup B$, and $A \cup C$

15. Given A = {2, 3, 4}, B = {1, 2} and C = {4, 5, 6}, find A+B, B+C, A+B+C and (A+B)+(B+C)

16. Write the members of $\{a, b\} \times \{1, 2, 3\}$.

17. Write $A \times B \times C$, B^2, A^3, $B^2 \times A$, and $A \times B$ where A = {1}, B = {a, b} and C = {2, 3}.

18. Show by means of example $A \times B \neq B \times A$ and $(A \times B) \times C \neq A \times (B \times C)$

19. Explain the properties of relation with example

20. Give an example of a relation which is both symmetric and Antisymmetric.

21. Show that whether the following relations are transitive

    R1 = {<1, 1>}

    R2 = {<1, 2>, <2, 2>}

    R3 = {<1, 2>, <2, 3>, <1, 3>, <2, 1>}

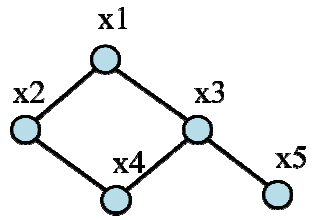
22. Given a set S = {1, 2, 3, 4, 5}, find the equivalence relation on S which generates the partition {{1, 2}, {3}, {4, 5}}. Draw the graph of the relation.

23. Given the relation matrix M_R of a relation R on the set {a, b, c}, find the relation matrices of $R^{\sim}$, $R^2 = R \circ R$, $R^3 = R \circ R \circ R$, and $R \circ R^{\sim}$

    MR = $\begin{pmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{pmatrix}$

24. Let A be the set of factors of a particular positive integer m and let $\leq$ be the relation divides i.e. $\leq$ = {<x, y> | $x \in A \wedge y \in A \wedge$(x divides y)}. Draw Hasse diagram for
    a. m = 12
    b. m = 45
    c. m = 36

25. Figure gives the Hasse diagram of a partially ordered set <P, R> where P = {x1, x2, x3, x4, x5}



Find which of the following are true

a. x1Rx2
b. x4Rx1
c. x3Rx5
d. x2Rx5
e. x1Rx1
f. x2Rx3
g. x4Rx5

Find the least and greatest members in P if they exists.

Also find the maximal and minimal element of P.

Find the upper bound and lower bound of {x2, x3, x4}, {x3, x4, x5} and {x1, x2, x3}.

Also indicate the LUB and GLB of these subsets if they exist.

26. Which of the following systems satisfy the properties of <I,+,X> which are designated by (A-1) to (A-4), (M-1) to (M-3) and distributive for the following set where all elements are odd integers.

27. Simplify the following Boolean expressions: (a *b)' + (a +b)'

28. Prove the theorem that the kernel of homomorphism g from a group <G,*> to <H , δ > is a semigroup of < G,*>.

29. Prove the following Boolean identity
(a + (a' * b) = a + b

30. Obtain the sum-of products and products-of-sums canonical forms of the following expression. $[(x_1 + x_2)\ (x_3\ x_4)']'$

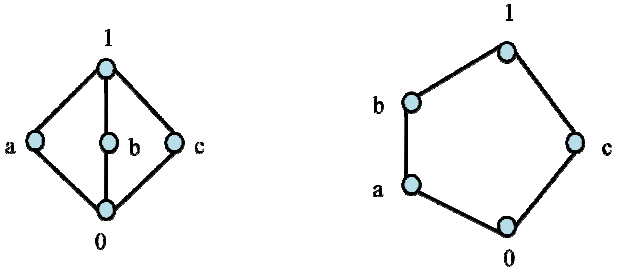
31. Prove that the set G = {1, 2, 3, 4, 5, 6, 7} is a group with respect to multiplication modulo

32. List all possible functions from X = {a, b, c} to Y = {0, 1} and indicate in each case whether the function is one-to-one, is onto, and is one-to-one onto.

33. List all possible functions from X = {x, y, z} to Y = {5, 6} and indicate in each case whether the function is one-to-one, is onto, and is one-to-one onto.

34. Prove that the set G = {0, 1, 2, 3, 4} is a monoid with respect to addition modulo.

35. Show that the following simple but significant lattices are not distributive.

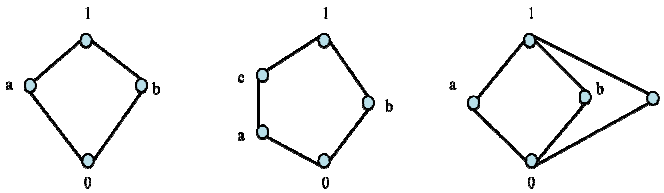


36. Let A = {a, b}, check whether the following table define a semigroup or monoid on A?

*	a	b
a	a	a
b	b	b

37. Prove that the set G = {0, 1, 2, 3, 4, 5, 6, 7} is an abelian group with respect to addition modulo 8.

38. What are different types of lattice? Explain with example. Show that the lattices shown in Fig (a), (b) and (c) are complemented lattices.



39. Show that the (2, 6) encoding function e: B2 → B6 defined by

e(00) = 001000
e(01) = 010100
e(10) = 100010
e(11) = 110001

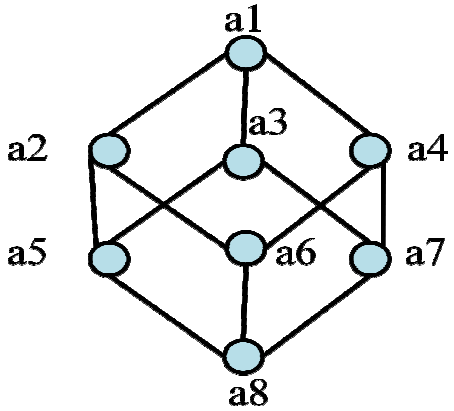
is a group code.

How many errors can it detect and correct?

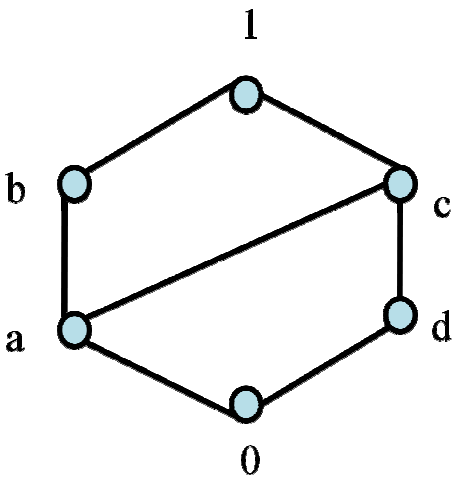
40. Explain about group codes with suitable example.
41. Explain algorithm for conversion of Infix Expression to Polish Notation
42. What is rank of formula? Explain with example
43. What is algebraic system? Explain with example
44. What is semigroup? Explain with example
45. What is monoid? Explain with example
46. What is group? Explain with example
47. Find the complements of every element of lattice $<S_n, D>$ for n = 75.

48. Explain the term lattice with example.

49. Let $<L,\leq>$ ba a lattice in which L = {a1, a2, …, a8} and S1, S2 and S3 be the subsets of L given by S1 = {a1, a2, a4, a6}, S2 = {a3, a5, a7, a8} and S3 = {a1, a2, a4, a8}. Check whether S1, S2 and S3 are sublattice?



50. Show that the following simple but significant lattice is distributive



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Machine Learning (Honour degree subject)

SY CSE-II (Honour degree)

Question bank for University Theory Exam.

04 Marks Questions.

1) Explain Machine learning with its applications.
2) Explain probability with example.
3) What do you mean by Regression? Explain logistic regression.
4) Describe Decision Tree with example.
5) Define Machine Learning. Explain Learverging the power of machine learning.
6) Determining the Best Learning Model.
7) Illustrate how machine learning can impact on applications.
8) Explain supervised learning with example.
9) Explain unsupervised learning with example.
10) Elaborate on the selection of best learning model.
11) Explain the role of statics and data mining with the machine learning .
12) Explain cross validation choices.
13) Write a short note on applying feature engineering.
14) Explain the discovering the Incredible perceptron.
15) Explain Averaging model.
16) Explain Working with Data.
17) Elaborate exploring the World of Probabilities.
18) Explain checking Out-of-Sample Errors.
19) Explain avoiding Sample Bias and Leakage Traps.
20) Elaborate on discovering the Incredible Perceptron.
21) Write short note on classifying images,
22) Write note on testing Multiple Models.
23) Describe the concept of averaging Models.
24) Explain Growing Greedy Classification Trees.
25) How to determine the best learning model explain it?
26) Describe the use of statistics.
27) Explain choosing the Right Error or Score Metric.
28) Explain how to search for the Best Hyper-Parameters.
29) Explain selecting Features and Examples.
30) Explain how to prepare data for machine learning model building.
31) Explain the following term Training and Testing.
32) Explain how to validate the performance of ML model using validation data.
33) Explain updating by Mini-Batch and Online.
34) Explain tying Machine Learning Methods to Outcomes.

35) What is Machine learning? Explain Machine Learning Techniques.

36) Explain how Machine Learning can help to improve business process.

37) Explain clustering algorithm.

38) What is linear regression? Explain it with example.

39) Explain instance-based algorithms.

40) Explain the basic math required for developing ML models.

08 Marks Questions

1. What are steps in ML cycle? Explain the applications of ML in detail.
2. What are types of ML algorithms? Explain in details.
3. Explain in detail the steps in executing a Pilot Project.
4. Explain in detail Interpreting Learning as optimization.
5. What is ML? Explain in detail the different types of Machine learning algorithms

6. Explain in detail classifying images

7. Describe the concept of scoring opinions and sentiments.

8. Describe the concept of recommending product and movies.

9. Explain the future of machine learning as case study.

10. What is algorithm? Explain types of algorithms in Machine learning.

COA TY.B.Tech CSE Sem II
Subject : Computer Organization and Architecture (COA)

4 Marks questions

1. Define the following terms
   a) Computer Organization
   b)Computer Architecture

2. How Pascal's calculating machine works?

3. What is ENIGMA and ENIAC? Who contributed for the ENIGMA and ENIAC?

4. Prove that the associative law of algebra does not always hold in computers
.
5. Convert $(25)_{10}$ to (_____)$_2$ using remainder method.

6. Convert $(0.375)_{10}$ to (_____)$_2$ fraction using the multiplication method.

7. Represent $(3)_{10}$ in unsigned, sign magnitude, 1's complement,2's complement and excess 4 .

8. Define the following terms –byte, nibble,word and bit .

9. What are the steps that the control unit carries out in executing a program?

10.What is SPARC and ARC ? What are the ARC memory regions and their memory size?

11. Differentiate between personal mobile device (PMD) and desktop computing.

12.What are the two kinds of parallelism in applications ? How computer hardware in turn can exploit these two kinds of application parallelism in four major ways.

13. Show that the ratio of the geometric means is equal to the geometric mean of the performance ratios, and that the reference computer of SPEC Ratio matters not.

14. What is Principle of Locality?

15. Define Amdahl's law. What are the two factors on which it depends?

16. Suppose that we want to enhance the processor used for Web serving. The new processor is 10 times faster on computation in the Web serving application than the original processor. Assuming that the original processor is busy with computation 40% of the time and is waiting for I/O 60% of the time, what is the overall speedup gained by incorporating the enhancement?

17. Explain the use of I/O modules as part of a computer organization.

18.Explain the operation of direct memory access.

19.Explain the function and use of I/O channels.

20. Explain the block diagram of external device

21. What are the different types of I/O commands that an I/O module may receive when it is addressed by a processor.

22. Differentiate Memory-Mapped and Isolated I/O

23.What are the principles of linear pipelining ?

24.What is synchronous pipeline ?

25. What is the purpose of pipelining?

26. What are the principles of non linear pipelining?

27.What is antidependence and output dependence ?

28.What is data hazard ? What are the different types of data hazards explain with examples.

29..Explain the control dependence by taking code fragment.

30. Show how the loop would look on MIPS, both scheduled and unscheduled, including any stalls or idle clock cycles. Schedule for delays from floating-point operations, but remember that we are ignoring delayed branches.

8 marks questions

1. What is upward compatibility? How many levels are there in computer?
differentiate high level and low level.

2.What are the arithmetic and logic instructions of ARC ? give the example of each.

3.What are the fields of ARC assembly language format ? give an example of an instruction with those fields.

4. Explain the following formats of ARC
   a) Arithmetic format b) PSR

5. Write a note on following technology trends

Integrated circuit logic technology, Semiconductor DRAM, Semiconductor Flash and Magnetic disk technology

6. Explain the following terms a) SISD b) SIMD c)MISD d)MIMD

7. Some microprocessors today are designed to have adjustable voltage, so a 15% reduction in voltage may result in a 15% reduction in frequency. What would be the impact on dynamic energy and on dynamic power?

8. Find the number of dies per 300 mm (30 cm) wafer for a die that is 1.5 cm on a side and for a die that is 1.0 cm on a side.

9. Find the die yield for dies that are 1.5 cm on a side and 1.0 cm on a side, assuming a defect density of 0.031 per cm2 and N is 13.5.

10.What are the differences between programmed I/O and interrupt-driven I/O and discuss their relative merits.

11.What are the sequence of hardware events occurs,
When an I/O device completes an I/O operation?

12. Explain the dependency of following instructions.

```
DIV.D F0,F2,F4
ADD.D F6,F0,F8
S.D F6,0(R1)
SUB.D F8,F10,F14
MUL.D F6,F10,F8
```

13. How many bits are in the (0,2) branch predictor with 4K entries? How many entries are in a (2,2) predictor with the same number of bits?

14.What is pipeline hazards ? What are the different types of pipeline hazards ? explain with examples.

15. What are the five mainstream computing classes and list their system characteristics.

16. Disk subsystems often have redundant power supplies to improve dependability. Using the components and MTTFs from above, calculate the reliability of redundant power supplies. Assume one power supply is sufficient to run the disk subsystem and that we are adding one redundant power supply.

17.Explain the dependency of following instructions.

```
DIV.D F0,F2,F4
ADD.D F6,F0,F8
SUB.D F8,F10,F14
```

MUL.D F6,F10,F8

18.What are the functional units of von Neumann model of a digital computer? What are the features of each functional unit?

19. Suppose we have made the following measurements:
Frequency of FP operations = 25%
Average CPI of FP operations = 4.0
Average CPI of other instructions = 1.33
Frequency of FPSQR = 2%
CPI of FPSQR = 20
Assume that the two design alternatives are to decrease the CPI of FPSQR to 2 or to decrease the average CPI of all FP operations to 2.5. Compare these two design alternatives using the processor performance equation.

20. Show our loop unrolled so that there are four copies of the loop body, assuming R1 – R2 (that is, the size of the array) is initially a multiple of 32, which means that the number of loop iterations is a multiple of 4. Eliminate any obviously redundant computations and do not reuse any of the registers.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Final Year B.Tech. (Electronics & Telecommunication Engg.) (Part –II)
CBCS Pattern

Question Bank on Data Analytics

Section- I

Q2) Solve any four of the following: (4*4=16 M)

1) What is Big Data? What are the types of Big Data?
2) List and explain the characteristics of big data.
3) Ten friends scored the following marks in their end-of-year math exam: 23, 37, 45, 49, 56, 63, 63, 70, 72 and 82. Calculate the mean deviation and standard deviation of their marks?
4) Compute Q1 and Q3 for the data relating to the marks of 8 students in an examination given below 25, 48, 32, 52, 21, 64, 29, and 57.
5) Write a short note on scale types.
6) With suitable example explain Conversion from the nominal scale to binary values
7) With suitable example explain Conversion from nominal scale to relative scale.
8) What is Data Quality? What are the different kinds of problems of Data Quality?
9) What is Dimensionality Reduction? Explain the benefits of dimensionality reduction.
10) Write a short note on Descriptive Univariate Statistics.
11) What is Pearson correlation coefficient? Give its equation and discuss significance of its values.
12) How Normalization data is done using min–max rescaling?
13) List and explain different visualizations used for bivariate data.
14) List and explain different visualizations used for Multivariate data.
15) Explain the use of following univariate plots
    Pie, Bar, Line, Area and Histogram.
16) What are the most appropriate scales for the following examples? Also, Justify the choice.

    - university students' exam marks
    - level of urgency in the emergency room of a hospital
    - classification of the animals in a zoo
    - Carbon dioxide levels in the atmosphere.

17) What is difference between Normalization using standardization and Normalization using Min Max scaling? Complete the table using Min Max scaling.

Friend	Age	Education	Rescaled age	Rescaled education
Bernhard	43	2.0		

Gwyneth	38	4.2		
James	42	4.0		

Q 3) Solve any two of the following: **(2*6=12 M)**

1) Draw and explain big data architecture.
2) Draw and explain the KDD Process.
3) List and define Location univariate statistic parameters and dispersion univariate statistic parameters, with suitable example.
4) Consider a data set of the following numbers: 10, 2, 4, 7, 8, 5, 11, 3, and 12. Calculate Mean, Median, 1st Quartile, 2nd Quartile and 3rd Quartile. Also plot it graphically.
5) Consider a data set of the following numbers: 25, 48, 32, 52, 21, 64, 29, and 57. Calculate Mean, Median, 1st Quartile, 2nd Quartile and 3rd Quartile. Also plot it graphically.
6) Write a short note with an example on: a) Pie Chart b) Bar Chart c) Histogram Chart
7) What insight of data we get from Histogram? Draw a histogram for the "Weight" and Company attribute from Contact list Table 1 given below

Contact	Maxtemp	Weight	Height	Years	Gender	Company
Andrew	25	77	175	10	M	Good
Bernhard	31	110	195	12	M	Good
Carolina	15	70	172	2	F	Bad
Dennis	20	85	180	16	M	Good
Eve	10	65	168	0	F	Bad
Fred	12	75	173	6	M	Good
Gwyneth	16	75	180	3	F	Bad
Hayden	26	63	165	2	F	Bad
Irene	15	55	158	5	F	Bad
James	21	66	163	14	M	Good
Kevin	30	95	190	1	M	Bad
Lea	13	72	172	11	F	Good
Marcus	8	83	185	3	F	Bad
Nigel	12	115	192	15	M	Good

8) What is attribute selection? Explain the techniques of attribute selection.
9) Discuss and give the solution for the following problem associated with data quality
   - Missing Values.
   - Redundant Data

- Inconsistent data
- Noisy data
- Outliers

10) What is attribute aggregation? Explain the techniques of attribute aggregation.
11) Define the following frequencies for the data

    absolute frequency,

    relative frequency and

    absolute cumulative frequency

    relative cumulative frequency

    Calculate the absolute and relative frequencies and respective cumulative frequencies for the attribute "Weight" in shown in above question
12) Why dimensionality reduction is required as preprocessing? How PCA is used for dimensionality reduction.
13) Create Contingency table with absolute joint frequencies for "company" and "gender" for the data in Table1
14) Discuss in detail Multivariate visualization with Modified scatter plot, parallel coordinate plot, star plot and Chernoff faces.

Section-II

Q4) Solve any four of the following: (4*4=16 M)

1) What is R? What are the features of R Programming Language?
2) What are the attributes in R?
3) Explain any four data types with an example in R.
4) Explain any four operators with an example in R.
5) Write an R program to create a data frame having employee_name, employee_id, and salary.
6) Create a matrix and show a) how items can be accessed from rows and columns?

    b) how to add rows and columns?
7) Write a short note on Data repositories- analyst perspective.
8) Write a short note on Applications of Big data analytics.
9) What are the objectives for using data visualization?

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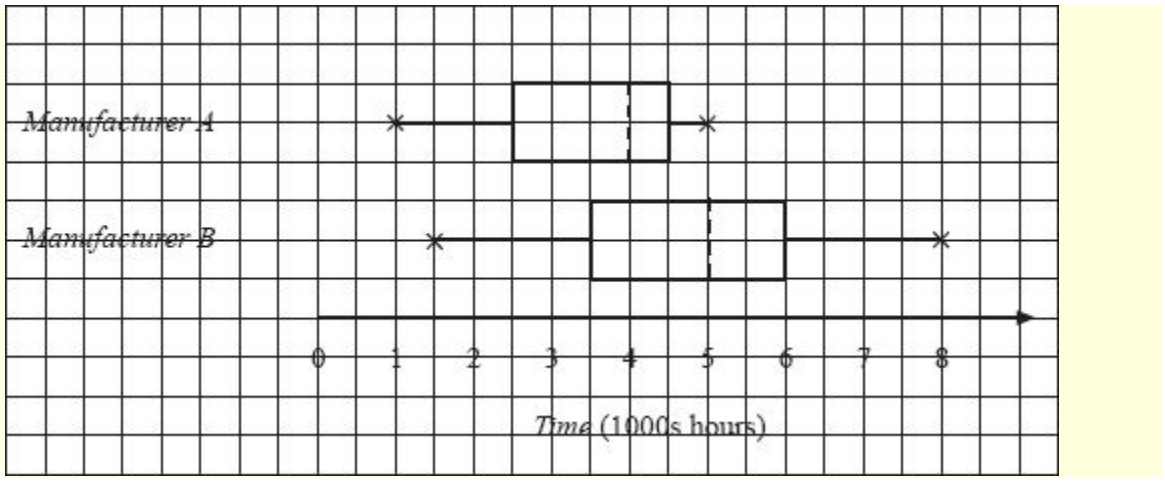
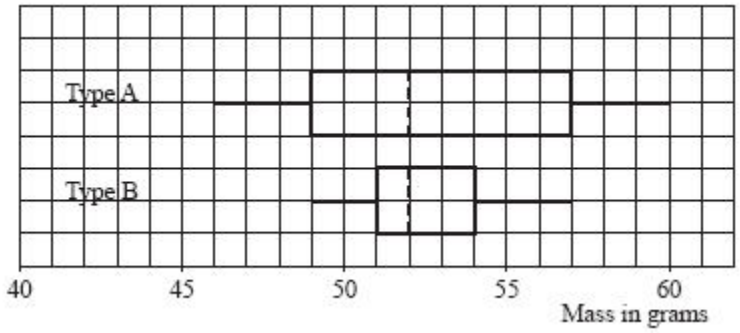
CBCS Pattern

Question Bank on Data Analytics

10) What are the Challenges to Big data visualization?
11) Write a R code for generating covariance matrix
12) Explain different sources of Big Data
13) Discuss the role played by the Data devices, Data Collectors, Data Aggregators and Data Users & buyers in Emerging Big Data Ecosystem?
14) What are challenges of big data visualization presented by the "four Vs" of big data?
15) How arrays and Matrices are created in R? Explain with suitable example.
16) What are different descriptive statistics we get by using summary( ) function in R
17) Enlist and explain the R Functions for Visualizing a Single Variable
18) Discuss five main sets of skills and behavioral characteristics of Data scientists.
19) The two box and whisker plots show the data collected by the manufacturers on the life-span of light bulbs. From this data, which manufacturer produces the better light bulb?



20) A gardener collected data on two types of tomato. The box and whisker plot below shows data for the masses in grams of the tomatoes in the two samples. Compare and contrast the two types and advise the gardener which type of tomato he should grow in future.



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CBCS Pattern

Question Bank on Data Analytics

Q 5) Solve any two of the following: **(2*6=12 M)**

1) What are the data structures in R? Explain any three with an example.
2) What is Big Data? Draw and discuss Typical analytic architecture for Big Data Analytics.
3) Complete the following table for NOIR scale types.
4) Enlist the problems for big data visualization and suggest solutions to these problems
5) How visualizations of data can be done using histogram, scatter plot, line chart, bar chart, pie chart, area chart?
6) What will the output of following statements in R

```
i <- 1
sport <- "football"
flag <- TRUE
class(i)
typeof(i)
class(sport)
typeof(sport)
class(flag)
typeof(flag)
is.vector(i)
is.vector(flag)
is.vector(sport)
u <- c("red", "yellow", "blue")
u
u[1]
v <- 1:5
v
sum(v)
w <- v * 2
w
w[3]
z <- v + w
z
z > 8
z[z > 8]
z[z > 8 | z < 5]
```

7) Complete the following NOIR data attribute table.

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CBCS Pattern

Question Bank on Data Analytics

	Nominal	Ordinal	Interval	Ratio
Definition				
Examples				
Operations				

8) Explain four Data Visualization techniques Using R.
9) Differentiate between BI and Data Science.
10) Draw and explain typical architecture of big data analytics.
11) Explain analytical techniques used in Big data visualization.

TY(E&TC)-II
Subject: Electronics System Design
Sample Question Bank

Note: The questions are for reference only.

Section I

1. Explain the construction and working of SCR?
2. Explain the construction and working of DIAC?
3. Explain the construction and working of TRIAC?
4. Describe different modes of operation of a thyristor with the help of its static V-I characteristics.
5. Explain two transistor analogy of SCR? Also discuss triggering conditions of SCR.
6. Explain different turn on methods of SCR
7. Explain why
   (i) the inner two layers of an SCR are lightly doped and are wide.
   (ii) the inner n layer of an SCR is doped with gold
   (iii) I_H is less than I_L.
8. What is commutation? Explain any one commutation method in detail.
9. Draw and explain the turn on switching characteristics of SCR.
10. Draw and explain the turn off switching characteristics of SCR.
11. Derive the expression for Average voltage and current for Single phase half wave-controlled rectifier.
12. An SCR is used to control the power of 1 KW, 230 V, 50 Hz heater. Determine the heater power for firing angles of 50^o.
13. Derive the expression for Average voltage and current for Single phase full wave-controlled rectifier.
14. Derive the expression for Average voltage and current for Single phase fully controlled bridge rectifier.
15. Explain the significance of freewheeling diode.
16. With waveform show the effect of firing angle on o/p of the controlled rectifiers.
17. Explain the use of DIAC -TRIAC for lamp dimmer
18. Design an AM Mixer using balanced modulator and explain its working.
19. With the help of block diagram, explain the balanced modulator IC 1596.
20. With the help of block diagram explain PLL IC 565.
21. Explain in detail different applications of PPL.
22. Design a PSK demodulator using PLL IC 565 and explain its working.
23. Design a FSK demodulator using PLL IC 565 and explain its working.
24. Design a FM demodulator using PLL IC 565 and explain its working.
25. Explain how PLL is used as a frequency synthesizer.
26. With the help of circuit diagram explain in detail the two-transistor analogy of SCR. Derive the relationship between collector and base current.
27. Describe the operation of single -phase, two-pulse, mid- point converter with relevant voltage and current waveforms. Discuss how each SCR is subjected to a reverse voltage equal to double the supply voltage in case turns ratio from primary to each secondary is unit.

28. Draw the construction and V-I characteristics of TRIAC. Explain its different modes of operation. State its advantages over SCR.
29. Draw and explain the switching characteristics of SCR.
30. With the help of circuit diagram and waveforms explain the working of single-phase full-wave controlled rectifier with resistive load. Sketch all the waveforms for $\alpha = 45^o$ and $\alpha = 120^o$. Analyze the waveforms and comment on the average output.
31. With the help of circuit diagram and waveforms explain the working of single-phase full-wave controlled rectifier with inductive load. Sketch all the waveforms for $\alpha = 30^o$ and $\alpha = 150^o$. Analyze the waveforms and comment on the average output.
32. With the help of circuit diagram and waveforms explain the working of single-phase full-wave controlled rectifier with inductive load. Sketch all the waveforms. Derive the expression for average load voltage and current. What is the effect of freewheeling diode explain in detail?
33. With the help of circuit diagram and waveforms explain the working of single-phase half-wave controlled rectifier with inductive load. Sketch all the waveforms for $\alpha = 30^o$ and $\alpha = 120^o$. Analyze the waveforms and comment on the average output.
34. Explain in detail the rectifying mode and inverting mode of operation of fully controlled bridge circuit with R-L load.
35. If a half wave controlled rectifier has purely resistive load of R and the delay angle is $\alpha = 60^o$, determine; rectification efficiency, form factor, ripple factor, transformer utilization factor, peak inverse voltage for SCR T_1.
36. Design a frequency synthesizer using IC 565 PLL to generate a frequency of 1 Hz to 999Hz. Crystal available is 1 MHz. Use thumbwheel switches.
37. Design a frequency synthesizer using IC 565 PLL to generate a frequency of 1 KHz to 999 KHz. Crystal available is 1 MHz. Use thumbwheel switches.
38. Design a frequency synthesizer using IC 565 PLL to generate a frequency of 1 KHz to 999.9 KHz. Crystal available is 1 MHz. Use thumbwheel switches.
39. Design a 100 Hz nominal clock frequency suitable for DVM derived from 50 Hz mains using PLL 565.
40. With the help of block diagram explain working of PLL IC 565. For a free running frequency of 500 KHz, determine value of fL, fC, and VCO external register and capacitor.

Section II

1. Design a timer using IC XR 2240 to generate a delay of 500 sec.
2. Design a timer using IC XR 2240 to generate a delay of 2 years. Design using two ICs.
3. With the help of block diagram explain the internal structure of IC XR 2240 timer IC.
4. With the help of circuit configuration, explain how IC 2240 works in monostable mode and an astable mode.
5. Design an attenuator circuit to measure the voltage in the range of 0 – 2000 V.
6. With the help of diagram explain the working of DVM.
7. With the help of block diagram, explain the working of dual slope A to D convertor
8. Step by step, design the DVM using 3 ½ display to measure 2 V.
9. With the help of block diagram explain frequency measurement system.
10. Explain the significance of each block in Time period measurement system.
11. With the help of block diagram explain the working of IC 74C926.

12. Design a frequency counter for measurement of frequency upto 1MHz.
13. Design a frequency counter for measurement of frequency upto 100 KHz with resolution of 0.01 KHz using IC 74C926. Use common anode display.
14. Design an event counter to count no of vehicles passing on the bridge. Use IC 74C926. Use common cathode display.
15. Design an offset V-I converter to convert 2 V to 8 V into 4mA to 20 mA.
16. Design a floating load current to voltage converter to convert 4 mA to 20 mA into 0 to 5V.
17. Design a signal conditioning circuit using transducer bridge and instrumentation amplifier to convert the temperature from 0^{o} C to 100^{o} C in to 0 to 10 V.
18. Design a Zero -Span circuit to convert 2 V – 5 V to 0 V – 5V.
19. Design a V to V converter to convert 2 to 6 V into 0 to 10 V.
20. Output voltage from sensor is 2.5 V to 7.5 V for remote load, use voltage to current converter. Required current range is 4 to 20 mA and convert current into equivalent voltage where required voltage is 0 to 10V.
21. With the help of diagram explain the working principle of J type thermocouple.
22. Design a signal conditioning circuit using PT 100 or LM 35 or Thermocouple to convert the temperature from 100^{o} C to 500^{o} C.
23. With the help of block diagram explain the working of PLC.
24. Compare how PLC is different from relay circuit.
25. Draw the block diagram for bottle filling plant and ladder diagram and explain the working of bottle filling plant.
26. Draw the block diagram for bottle filling plant and ladder diagram and explain the working of elevator control.
27. Design an On-Off controller to control temperature in the range of 100^{o} C to 400^{o} C with the set point of 300^{o} C.
28. Design an On-Off controller with dead band to control temperature in the range 100^{o} C to 400^{o} C with the set point of 200^{o} C. Dead band is 10^{o} C.
29. Design a proportional controller to meet following specification –
    PB = 50 %, error max = ± 4 V, full scale output =12 V, zero error causes 30 % controller output.

CHAPTER 1
SAFETY AND PREVENTION OF ACCIDENTS

1. Define the following terms in connection with safety:
a. Safety
b. Hazard
c. Accident
d. Major accident hazard
e. Responsibility
f. Authority
g. Accountability
h. Monitoring
2. Which are the primary instructions to be followed to provide safe working conditions by all persons and at all times?
3. When working on live conductors, what personal apparel should be kept in mind?
4. State as per IS, what Do's and Don'ts be observed for sub-station operations?
5. What do you mean by electrical accident? What are different causes of electrical accident?
6. State procedure to be followed for shut down of sub-station and power lines.
7. Explain in brief the procedure for rescuing the person who has received an electric shock.
8. Explain in brief any one method of providing artificial respiration.
9. What are causes of fire due to electrical reasons?
10. What are different types of fire extinguishers used to extinguish fire due to electrical reasons? Explain their mode of operation in brief.
11. State different factors on which severity of electric shock depends.
12. What precautions you will take to avoid fire due to electrical reasons?
13. What steps are to be taken if you come across electric shock victim.
14. What are the types of fire extinguishers? State their applications.
15. When and how long the artificial respiration is given?
16. Describe the procedure of charging the transmission line after maintenance is completed.
17. State the procedure in substation to take shut down.
18. Give reason : Body of electrical machine gives shock.
19. What are the precautions will you take if the person gets an electrical shock?
20. Explain Silvester's method of providing artificial respiration?
21. What are the causes of electrical accidents?

CHAPTER 3
TESTING & MAINTENANCE OF ROTATING MACHINES

1. What are the objectives of testing?
2. What is significance of ISS?
3. Explain the concept of Tolerance?
4. What are the different types of testing?
5. What do you mean by direct and indirect testing?
6. What is the preliminary test which are to be done before commissioning equipment?
7. Explain merits and demerits of direct, indirect and regenerative method of testing?
8. Enlist the routine test and explain any one in detail.
9. Enlist the type test and explain any one in detail.
10. Enlist the special test and explain any one in detail.
11. Explain how will you find the efficiency of motor generator set when one machine is calibrated?
12. Explain the Swinburn test on D.C machine with its limitation.
13. What is failure of electrical machine? What are the probable reasons causing the failure of electrical machine?
14. Why maintenance of electrical machine is necessary? Explain its categories.
15. What do you mean by preventive maintenance? State advantage of it.
16. Explain the procedure for developing preventive maintenance schedule.
17. What is the frequency of inspection? Explain it in detail.
18. What do you mean by breakdown maintenance? State the steps for this type of maintenance and checks to be carried out.
19. Explain in brief “Total Productive Maintenance”
20. Distinguish between routine and breakdown maintenance of electrical equipment.
21. Distinguish between routine and type test.
22. State objective of testing of machine? Explain the brief Routine test, Type test and Supplementary test.
23. Explain High voltage test, commutation test for d.c machine.
24. Classify the test to be conducted on 3 ph I.M as per ISS.
25. What is the purpose of conducting reduced voltage running up test? Explain how it is carried out?
26. Explain no load test on 3 ph I.M and plot its characteristics.
27. Explain voltage ratio test on 3 ph slip ring I.M with circuit diagram.
28. What are the permissible limits for safe working of electrical machine?
29. Explain the necessity of conducting temp rise test and give limits of temp rise for different parts of 3 ph I.M. as per ISS.
30. What do you mean by normal working of electrical machine?
31. Plan the preventive maintenance schedule for storage batteries used in the relay room of the receiving station.
32. How will you carry out maintenance of silica gel breather?
33. State and explain the conditions to be needed before connecting the alternators in parallel.
34. What are the synchronizing methods of alternators ?Explain them in detail.
35. What is the need of connecting the alternators in parallel.
36. Describe the routine test and type test on 1 ph as well as on 3ph I.M
37. Describe the points to be considered for annual maintenance of 3ph I.M
38. What are the special tests on 1 ph as well as on 3ph I.M
39. Explain brake test on d.c series series motor.

CHAPTER 4
TESTING & MAINTENANCE OF TRANSFORMERS

1. State the importance of planning of preventive maintenance schedule for transformers.
2. State conditions for parallel operations of transformers.
3. Distinguish between routine and break-down maintenance of electrical equipment.
4. Give maintenance schedule for distribution transformers as per ISS 1886-1967.
5. Explain open delta method of testing of transformers.
6. Explain back-to-back test for efficiency of transformer.
7. State the factors affecting preventive maintenance schedule along with its advantages.
8. Draw a neat diagram of Sumpner's test and explain how this can be used for finding the efficiency of transformers under test?
9. What is the purpose of carrying out impulse test on transformers?
10. What are type tests of 3ph transformers as per ISS? Explain any one in detail.
11. Classify the different test carried out on transformers as routine, type and special test.
12. Explain the procedure for conducting HV test on transformers?
13. Draw the equivalent circuit of two transformers connected in parallel along with mathematical expressions.

CHAPTER 5
TESTING & MAINTENANCE OF INSULATION

1. State factors on which life of insulation depends.
2. List the properties of transformer oil.
3. Explain in brief, how the cleaning of insulation covered with loose dry dust sticky dirt, oily viscous film is carried out.
4. State the properties of transformer oil. List out the various tests to be performed on transformer oil.
5. State the various methods of revarnishing. Explain the neat sketch vaccum impregnation method of varnishing.
6. How will you interpret about the condition of insulation?
7. Classify insulating materials as per IS.
8. What is insulation resistance? How it is measured?
9. What is the necessity of revarnishing?
10. Give the applications of insulating material.
11. Describe with neat sketch
    a. Acidity Test
    b. Sludge Test
    c. Crackle Test
    d. Flash point
    e. Flash point Test
12. Why there is the necessity of filtration of transformer oil? How it is carried out?
13. What care should be taken to protect electrical equipment during the period of inactivity?
14. How insulating oil is contaminated? Explain about their action.
15. What is the necessity to dry out the insulation? Describe the methods.
16. Differentiate between internal heating and external heating applied to electrical machines.

CHAPTER 6
Electrical Installation

1. State the permissible limits of variation of
   a. Voltage
   b. Speed
   c. Current
   d. Frequency
2. Explain the significance of trouble shooting of various electrical machines.
3. Write trouble shooting chart of 3 ph I.M
4. State maintenance schedule of storage batteries.
5. State the external causes of failure of electrical equipment.
6. Enlist the common troubles in electrical installation and cables.
7. Explain the use of:
   a. Growler
   b. Filler gauges
   c. Dial Indicator
   d. Earth tester
   e. Megger
8. Prepare trouble shooting chart for DC Generator and DC Motor
9. Prepare trouble shooting chart for transformer.
10. Prepare trouble shooting chart for single phase induction motor
11. What is single phasing? How it will affect on the performance of 3 ph IM.
12. Give trouble shooting chart for lead acid battery.
13. Explain Murray loop test and fault distance in case of underground cable.
14. State the probable faults in switchgears.
15. Write maintenance schedule for overhead lines, relays and C.B
16. What is MCCB? How it operates?
17. Compare MCB with fuse.
18. What is ELCB? How it operates? State its application.
19. Give constructional details of Megger along its working.
20. What are the protections provided by RCCB?
21. State and explain working of RCCB.
22. Enlist the different tools used in inspection, checking, maintenance and repair works in electrical field.
23. State the uses of sprit level.
24. What are the effects of mis-alignment?
25. List the common trouble in electrical installation.
26. Explain the factors involved in designing the machine foundation.
27. What are the requirements of foundations for installing rotating electrical machines as per IS 900-1992?
28. Explain the procedure to be followed is aligned two shafts to be
    a. Directly coupled
    b. In directly coupled.
29. Enlist various devices and tools in loading and unloading of heavy electrical equipment.
30. What are the factors involved in designing the machine foundation?
31. Explain the procedure for leveling and alignment of electrical machines.
32. What are the factors which are to be considered while designing the foundation for static and rotating machines?
33. What are the requirements of installing rotating electrical machines?

CHAPTER 2
Electrical Estimation and Design
CHAPTER 6
Electrical Installation

1. The main circuit wire in a house is required to carry a current of 45 amperes when connected to single phase a.c. supply. Determine the size of the wire if the length of the circuit is 40 metres.
2. A 33 KV substation is to be Connected to a 11 KV stepdown substation which is at a distance of 1.5 km by a underground cable. If the size of the transformer in the stepdown substation is 500 KVA, determine the size of the cable.
3. An underground cable is to be connected to a multi-storey building with the feeding substation at a distance of 2 km. The connected load is 500KW at 400 volts at a diversity factor of 0.7 and p.f as 0.8. Suggest if the building can be directly connected by a L.T. feeder from the substation
4. A 6.6. KV feeder of length 1 km is to be erected to feed on Industrial substation of 500 KVA. capacity. Find out the suitable size of A. C. S. R?, conductor to be used for the purpose.
5. An 11 KV overhead line is to be erected for feeding a substation at a distance of 5 km which has to feed the following connected L. T. load. Determine the size of conductor and transformer
   Load: (i) Lighting: 210 KW (Single phase)
   (ii) Fans, a- conditioner :66 KW (Single phase)
   (iii) Industrial :200 KW ('three phase)
6. The main circuit wire in a house is required to carry a current of 45 amperes when connected to single phase a.c. supply. Determine the size of the wire if the length of the circuit is 40 metres.
7. A room is to be wired for single phase ac. Supply directly taken from mains which has declared voltage of 200 volts. The length of the wire from the main switch to sight and plug points is 30 metres. lithe wire is to carry 5 amps determine the size of conductor.
8. Determine the size of underground cable to be laid for transmitting electrical energy at 11 "from the substation to the distribution substation at a distance of 500 metres of capacity 300 KVA.

Class: TY B.Tech (Electronics Engineering) Part I **Sub.: Electronics System Design**

Question Bank

Section _I

Questions for 4 marks (Q.2)

1. Classify and compare electronics product.
2. Implement data acquisition system for the microcontroller based temperature control using RTD.
3. State and explain various stages/phases of hardware design in electronics product development.
4. What are the various electronics product requirements?
5. Draw and explain basic block diagram of 4-channel data acquisition system.
6. Explain different constructs of regular program.
7. State and explain various stages/phases of software design.
8. Explain recommended steps to be followed in a software development in real life microprocessor based product design.
9. What are the goals of software design?
10. How simulator can be used in software design and product development?
11. Draw and explain software structure diagram for data acquisition system.
12. Develop the one page brochure for any suitable electronic product.
13. Develop the one page user manual for any suitable electronic product.
14. Explain product development cycles.
15. What are the expectations from the user for electronic consumable product.
16. Define battery management System and explain it in detail.
17. PT100 interfacing circuit
18. Working of thermocouple
19. Types of thermocouple
20. Types of batteries
21. Comparison of batteries
22. Working of LDR
23. Interfacing of LDR
24. Working of DHT11
25. Interfacing of DHT11

Questions for 6 marks (Q.3)

1. Working of LM35
2. Temperature measurement system using LM35
3. Interfacing of LLM35

4. Various phases in software design.
5. Program Constructs
6. Design of single cell Li-ion battery Charger
7. Design of single cell Li-ion battery Charger with temperature compensation
8. Design of single cell Ni-MH battery Charger
9. Design of single cell NI-MH battery Charger with temperature compensation
10. Signal conditioning circuit for PT100
11. Interfacing of PT100
12. Temperature measurement using PT100
13. Temperature measurement using thermocouple
14. Data acquisition system for PT100
15. Components of battery management system

Sectrion_II

Questions for 4 marks (Q.4)

1. PCB design rules for digital circuits.
2. PCB design rules for analog circuits.
3. Layout rules in PCB design.
4. Block diagram of Smart Card Systems.
5. Signal in RS485 serial protocol.
6. Memory mapped IO
7. IO mapped IO
8. Compare memory mapped IO and IO mapped IO
9. The various steps to be followed in PCB design.
10. The meaning of RS232 signals
11. Interfacing of RS232
12. Interfacing of RS485
13. Note on Graphical LCD
14. Hardware components of Digital Camera.
15. Software components of Digital Camera.
16. Working of touch sensor
17. Temperature controller system
18. Pressure controller
19. Block diagram of attendance monitoring system
20. Types of PCB
21. Note on Noise due to ground and supply line in PCB design
22. Note on Grounds, returns in PCB design
23. Note on Shields in PCB design
24. Microcontroller interfacing techniques

Questions for 6 marks (Q.5)

1. Hardware and software components of simple digital camera.
2. Design requirements which need to be considered in PCB design.
3. Interfacing of the touch sensor TTP223B
4. Develop the system for RFID based attendance monitoring system.
5. Interconnection parameters Resistance
6. Interconnection parameters Capacitance
7. Design of temperature controller
8. Interfacing of Graphical LCD
9. Interfacing of touch sensor
10. Comparison between RS232 and RS485
11. Development of digital camera
12. Development of smart card system
13. Important terms in PCB design
14. PCB design elements
15. Interconnection parameters- Inductance in PCB design

SEAT No.: SET-A

TY. B.Tech(Part-I)(new) Examination Apr/May-2022

Electronics Engineering

Microcontrollers

Section-I

Q.2 Attempt any three. 12

1) Explain in brief the types of Interrupts available in 8085.

2) What is microprocessor? Give the power supply &clock frequency of 8085.

3) What are the functions of an accumulator?

4) Explain the 16 – bit registers of 8085 microprocessor..

5) Explain priority interrupts of 8085?

6) What is the signal classification of 8085?

7) Define instruction cycle, machine cycle and T-state?

8) Give the register organization of 8085?

9) explain flags in 8085

10) Difference between memory mapped I/O and peripheral I/O?

11) Write an assembly program to find greatest between two numbers in 8085.

12) Differentiate between program memory and data memory in 8051

13) Give the addressing modes of 8051?

14) What is indexed addressing in 8051?

15) Write a program to save the accumulator in r7 of bank 2 in 8051.

Q.3 Attempt any two.

1) Explain The 8085 instruction set.

2) Explain The 8085 Addressing Modes with examples.

3) Explain the microcontroller 8051 Architecture .

4) List out the five categories of the 8085 instructions. Give e.g. of the instructions for each group ?

5)Explain about 8085- a) what is the difference between a JMP instruction and CALL instruction . b) What is the difference between the shift and rotate instructions?

6) Explain Serial Port Programming in 8051

7) What Events Can Trigger interrupts, and where do they go in 8051?

8) Explain UART communication in 8051

9) Explain interfacing of external memory with 8051.

10) write a short note on timers and counters in 8051.

Section-II

Q.4 Attempt any three.

1) Explain Interfacing a 8051 to matrix Keyboard

2) Explain Interfacing a 8051 to stepper motor.

3) write the steps in interfacing the LCD with 8051

4) Explain Timer0 module in PIC 16F877A

5) Explain indirect Addressing Modes of PIC 16F877A

6) Explain the various SFRs of 8051.

7) Explain Harvard architecture in PIC with diagram

8) Write the instruction set for 16F877 with example.

9) Explain Parallel slave port communication in 16F877

10) How ADC works in 16F877?

11) compare Synchronous and asynchronous communication in 16F877

12) How PWM module works in 16F877?

13) Explain working of ports of 8051

14) Compare SPI and IIC module in MSSP in PIC.

15) Which functions are set through Configuration word in PIC16F877A?

Q.5 Attempt any two.

1) Interface Stepper Motor with 8051.
2) Explain architecture of PIC 16F877 microcontroller
3) Discuss interfacing of external 4K EPROM and 4K RAM with the microcontroller 8051.
4) Explain interfacing of stepper motor with microcontroller. Write program to rotate stepper motor in clockwise direction continuously in full step mode.
5) What is the CCP module in PIC 16F877A/ Explain in detail
6) Explain ADC interfacing with 8051 and its program.
7) Write a short note on a) SPI module b) I2C module.
8) Write a assembly program to interface LED and Switch with 16F877.
9) Write an 8051 assembly program to toggle all the bits of port 1 continuously with 2s delay,when interrupt 0 (INT0) is generated. Use timer 0, 16- bit mode to generate the delay of 01 Sec.
10) Write features, draw architecture of PIC 16F877 .

Final Year B.Tech. (Electronics & Telecommunication Engineering)
Part-II Examination, 2022
Elective-III - Industrial Internet of Things
Question Bank

SECTION-I

1. What is IIoT,
2. Discuss Key IIoT Technologies Catalysts and Precursors of the IIoT,
3. Explain Innovation and the IIoT,
4. Explain Key Opportunities and Benefits,
5. Explain The Digital and Human Workforce,
6. Discuss the Technical requirements for an IIoT application with example,
7. Explain IoT background,
8. Explain IoT enabling factors,
9. Explain IoT use cases with IoT key technologies,
10. Explain IoT and IIoT similarities and differences,
11. Explain IoT analytics and AI,
12. Explain Industrial Internet Use-Cases (Healthcare and Smart Office)
13. Discuss in detail the IIC Industrial Internet Reference Architecture,
14. Explain in brief Industrial Internet Architecture Framework (IIAF),
15. Explain the Three-Tier Topology in IIOT,
16. Explain the Key functional characteristics of connectivity
17. Explain the Key functional communication layer
18. Explain the important purposes of Storage, Persistence and Retrieval
19. Explain the types and methods of analytics
20. Explain any one Legacy Industrial Protocols,
21. Explain Modern Communication Protocols (Industrial Ethernet),
22. Wireless Communication Technologies (Bluetooth Low Energy),
23. Wireless Communication Technologies (6LoWPAN),
24. Explain Proximity Network Communication Technologies (IPv4)
25. Explain Proximity Network Communication Technologies (IPv6 for the IIOT)
26. Explain Proximity Network Communication Technologies (NAT)
27. Explain SigFox Low-Power WAN
28. Explain PLCs and DCS,Securing the OT,
29. Explain Network Level: Potential Security Issues,
30. Explain System Level: Potential Security Issues,
31. Explain Identity Access Management

Final Year B.Tech. (Electronics & Telecommunication Engineering)
Part-II Examination, 2022
Elective-III - Industrial Internet of Things
Question Bank

SECTION-II

1. Explain the AWS architecture for IoT
2. Explain the process of registering for AWS IoT core,
3. Explain the process of Storing data on AWS,
4. Explain AWS analytics with example ,
5. Explain the uses of Quick Sight
6. Explain Google Cloud IoT core
7. Explain why Bigtable is ideal for applications with very high throughput
8. Explain in brief Google Cloud analytics
9. Explain OpenStack ecosystem w.r.t identity
10. Explain OpenStack ecosystem w.r.t compute
11. Explain OpenStack ecosystem w.r.t storage
12. Explain OpenStack ecosystem w.r.t imaging, dashboard, networking
13. Explain the process of application development on OpenStack
14. Explain the process of deploying the application on OpenStack
15. Explain bare metal provisioning in OpenStack
16. Explain containers in OpenStack
17. Explain virtual machines in OpenStack
18. How configuration management in OpenStack works?
19. How does monitoring in OpenStack work?

TY. B.Tech(Part-I)(new) Examination Apr/May-2022

Electronics & Telecommunication Engineering

Microcontrollers & Applications

Section-I

Q.2 Attempt any three.

1) Compare different architectures of Microcontroller.

2) Explain development system in Microcontroller.

3) State addressing modes in 8051. Explain any one in brief with example.

4) Compare microprocessor and Microcontroller.

5) Explain Data memory distribution in 8051.

6) write the Features and specifications of 8051.

7) write a short note on Interfacing of external memory with 8051.

8) State **Registers for serial communication with field structure.**

9) what is Baud rate? How to set baud rate in 8051.

10) write ALP for delay 10ms; Use Timer 0 in Mode1.

11) write ALP for external interrupt INT0 (P3.2 pin); PORT 2 pins become OFF after INT0 is applied.

12) write ALP to copy data from R0 of Bank0 to R0 of Bank3.

13) write a short note on mechanics of programming.

14) Compare assembly programming and C-programming.

15) Explain assembler directives in ASM .

Q.3 Attempt any two.

1) Discuss interfacing of external 4K EPROM and 4K RAM with the microcontroller 8051.

2) What is Interrupt? Explain in brief the different Interrupts and related registers available in 8051 with the help of parameters- Priority and ISR Location.

3) Explain interfacing of stepper motor with microcontroller. Write program to rotate stepper motor in clockwise direction continuously in Half step mode.

4) Write and Develop ALP to turn 8 LEDs ON and OFF . (Use PORT 1)

5) Write ALP to interface 4x4 matrix keyboard with 8051

6) Explain the LCD interfacing steps with 8051

7) Explain in detail: Ports in 8051

8) write a program for the 8051 to transfer letter “A” serially at 4800 baud, continuously.

9) Explain different modes in Timer for 8051.

10) Explain the Interface of DAC with 8051.

Section-II

Q.4 Attempt any three.

1) Explain in brief the Functional architecture of PIC16F877A

2) Mention the various kinds of RESET? Explain any one in detail.

3).Explain different memory present in PIC 16F877A.

4).Explain different Ports in PIC 16F877A

5) Mention the key features of PIC 16F877A

6) Explain Interrupt control registers in PIC 16F877A

7) Explain CCP module in PIC 16F877A in detail

8) What is Timer module in PIC 16F877A

9) Explain Timer control registers in PIC 16F877A

10) Explain PWM module in PIC 16F877A.

11) Compare SPI and IIC in PIC 16F877A.

12) State UART control registers in PIC 16F877A.

13) What is the need of UART communication?

14) State the different applications of UART.

15) How many bits are required for addressing 2K & 4K program memories of PIC 16C61 respectively?

Q.5 Attempt any two.

1) Explain the terms in PIC 16F877A: i) BOREN ii) The Watchdog Timer

2) Which functions are set through Configuration word in PIC16F877A.

3) State Instruction set in PIC 16F877A.

4) Explain ADC with control registers in PIC 16F877A.

5) Explain SPI communication protocol in PIC 16F877A.

6) Explain various types of registers in PIC 16F877A

7) Write an 8051 assembly program to toggle all the bits of port 1 continuously with 2s delay, when interrupt 0 (INT0) is generated. Use timer 0, 16- bit mode to generate the delay of 01 Sec.

8) How to configure port as Input/ Output in PIC 16F877A.

9) What is the function of RESET ? Explain various kinds of RESET in 16F877A.

10) Explain with field structure : a) General Purpose register b) Special purpose registers.

Energy Audit and Management

Final year B.Tech Electrical SEM-I

Question Bank

4 Marks Question

1. Explain format and statement energy policy
2. Short note on SCADA
3. Short note on area of development of DSM in agricultural
4. Short note on area of development of DSM in domestics
5. Short note on area of development of DSM in commercial consumers
6. Explain least square method
7. Short note on case studies of sugar industry.
8. Short note on case studies of paper industry.
9. Short note on case studies of cement industry.
10. Short note on case studies of steel industry.
11. Explain energy conservation in diesel generator.
12. Short note on green building?
13. What are necessary skills of energy manager?
14. Explain type's energy tariff.
15. Write short notes on Kyoto protocol.
16. Write the notes on force field analysis
17. What is Sankey diagram? Explain with suitable examples.
18. What are the principles of writing a report of energy audit?
19. Discuss the cash flow diagram. What is the significance?
20. Explain various types of energy audit.
21. Enlist energy conservation opportunities in pumping system.
22. With suitable examples explain various options available for load curve wave shaping in demand side management.
23. Give the format of energy audit.
24. Explain various energy conservation opportunities in diesel generator

25. What do you mean by energy security? Explain few strategies to ensure energy security of our country
26. Explain salient features of Electricity Act 2003.
27. Write a note on wind energy.
28. Explain in details IE rules
29. Explain in detail various energy resources with examples.
30. Explain organization setup for energy management
31. Write a note on various energy management strategies.
32. Explain demand side management concept with advantages and disadvantages
33. Discuss apparent energy tariff.
34. What is Sankey diagram? Explain with suitable examples.
35. Short note on various energy conservation opportunities in illumination
36. Discuss various hear recovery system used in boiler.
37. Short note on Indian and Global energy scenario
38. Short note on importance of energy conservation
39. Discuss Energy Management Strategy.
40. Discuss solar air conditioning
41. Short note on Outcome of energy audit
42. Discuss various hear recovery system used in steam systems

6 Marks Question

1. Explain responsibilities and duties of energy manager act 2001
2. Explain energy conservation in motor and drive system.
3. Short note on power factor penalties and incentives in tariff for demand control
4. Write types of FACTs device and explain in details any two used in DSM.
5. Explain advantages, barriers and implementation of DSM
6. Explain working of automatic meter in utility energy management
7. Define energy management and explain objective of energy management
8. Write a short note on solar thermal technology as a energy source.
9. What is energy management? Discuss the principles of energy management.

10. What is energy conservation building code? List salient features of ECBC
11. Explain various instruments with functions of each used to carry out energy audit.
12. How cogeneration leads the energy conservation?
13. What are the various costing techniques
14. What is necessity of energy audit? Explain phases of energy audit.
15. Discuss United Nations Framework Convention on Climate Change.
16. What are the objectives of carrying out sensitivity analysis? And what are the different factors that are considered for the sensitivity analysis?
17. Discuss the key elements of energy management
18. Why it is important to reduce T and D losses? Discuss various methods for reducing technical losses.
19. Explain step wise procedure to carry out a detail energy audit
20. Explain direct and indirect use of solar energy with suitable examples
21. How demand side management is used to control agricultural and domestic load?
22. Explain various instruments with functions of each used to carry out energy audit.
23. Why it is important to reduce T and D losses? Discuss various methods for reducing technical losses.
24. Write a note on data and information analysis to understand energy conservation potential.
25. Short note on Energy Efficiency Programs
26. Short note on Cusum technique & least square method.
27. Short note on various energy conservation opportunities in motive power
28. Discuss various energy conservation opportunities in Ventilation
29. Short note on various energy conservation opportunities in cogeneration
30. Discuss various energy conservation opportunities in Diesel generators
31. Discuss various energy conservation opportunities in Air Conditioning systems
32. Discuss terms simple payback period & return on investment
33. Short note on Energy audit case studies on IT sector
34. Short note on Energy audit case studies on Textile
35. Short note on Energy audit case studies on Municipal corporations
36. Short note on Energy audit case studies on Educational Institutes,

37. Short note on Energy audit case studies on T and D Sector
38. Short note on Energy audit case studies on Thermal Power stations

Fourth Y. B.Tech. (Electronics & Telecommunication)

Question Bank on CMOS VLSI Design

Q. 1. Solve any four: **[4 X 4 =16 Marks]**

a. When Vgs of MOSFET with threshold voltage of 0.4 V, working in saturation region is 0.9 V, the drain current is observed to be 1 mA. Find the drain current if Vgs is 1.4 V.
b. Draw stick diagram of NAND gate.
c. Draw stick diagram of NOR gate.
d. Draw stick diagram of inverter.
e. Design NOR gate using CMOS logic.
f. Draw NAND gate using CMOS logic.
g. Design NOR gate using ratioed logic.
h. Design NAND gate using ratioed logic.
i. Differentiate between static and dynamic design in CMOS.
j. If supply voltage is 3 V and load capacitance is 5 fF, then calculate the amount of energy stored on the capacitor.
k. If supply voltage is 3 V and load capacitance is 5 fF, then calculate the amount of energy stored on the capacitor.
l. Define scaling. Explain the various types of scaling.
m. Design buffer using CMOS logic.
n. Explain the concept of dynamic CMOS logic with the help of example.
o. List out the various second order effects in MOS transistor.

Q.2. Solve any two: **[2 X 6 = 12 Marks]**

a. Explain various modes of operation in MOS transistor.
b. Explain the concept of Power, Energy and Energy Delay Product. If the load capacitance is 6 fF and supply voltage is 2.5 V, then calculate the energy required to charge and discharge the capacitance.
c. Obtain the current equations for MOS transistor in the cut off, non-saturation and saturation region.

d. Explain the various signal integrity issues in Dynamic CMOS logic design.

e. Design 4:1 multiplexer using CMOS logic.

f. Explain the static and dynamic power dissipation for CMOS inverter. Obtain the expression for total power dissipation.

g. Explain the following with respect to CMOS inverter:

   i. Switching threshold ii. Noise Margin

h. Define threshold voltage for MOS transistor. Also, explain with the help of equations various factors on which it depends.

i. Explain the various second order effects in MOS transistor.

Q. 3. Solve any four: **[4 X 4 = 16 marks]**

a. Explain multiplexer based positive latch.

b. Explain the concept of bistability principle.

c. Explain the concept of dynamic transmission-gate edge triggered registers.

d. Define the timing properties of registers.

e. Explain low voltage static latches.

f. Explain static SR flip flop.

g. Explain synchronizer with the help of neat diagram.

h. Explain clock skew and clock jitter.

i. Explain Wallace tree for 4 – bit multiplier.

j. Explain how PLL can be used to synchronize the clock.

k. Explain the concept of CLA adder with the help of equations.

l. Explain the concept of pseudo nMOS ROM with the help of neat diagram.

m. Explain the concept of 1 transistor DRAM cell. Also, draw the DRAM sub-array.

n. Explain the concept of Dual edge registers.

o. Write a note on:

   i. Mesochronous interconnect ii. Plesiochronous interconnect

Q. 4. Solve the following: **[2 X 6 = 12 Marks]**

a. Classify timings depending on local clock.

b. Explain the concept of Bistability with the help of neat diagrams. Also, explain metastability.
c. Explain how negative and positive level latches can be designed using multiplexers.
d. Explain C2MOS and TSPCR approach for skew tolerant.
e. Explain various clock distribution techniques.
f. Explain the concept of clock skew and clock jitter. What are the various sources of Clock skew and clock jitter?
g. Explain the concept of clock distribution. What are the techniques to reduce clock skew and clock jitter?
h. Explain the concept of CLA adder with the help of equations.
i. Explain the concept of 6 transistor SRAM cell. Also, explain read and write operation using this memory cell.

EG & CAD Question Bank

Projections of Lines	
Oblique Line : 3 Marks	
1	The top view of a 75 mm long line AB measures 65 mm, while the length of its front view is 50 mm, it's one end 'A' is in the H.P and 12 mm in front of the V.P. draw the projections of AB and determine its inclinations with the H.P. and the V.P.
2	Draw projections of line AB and measure true length if it makes apparent angle 40^0 with HRP and FVL is 50 mm. consider point A 15 mm from both HRP and FRP and point B 40 mm in front of FRP.
3	Draw the projections of line MN and measure true length if its apparent angle with H.P is 50^0 and FVL is 60 mm. point 'M' is 10 mm from both H.P and V.P and point 'N' is 50 mm in front of V.P.
4	Draw the projection of line RS 70 mm long and making 40^0 with V.P the front view of line makes an angle of 50^0 with H.P point 'R' is 15 mm from both H.P and V.P. Draw the projection of the line, find the angle made by line with H. P.
5	Line VM measures 80 mm . Its FVL is 65 mm, while TVL is 73 mm. Point V is 15 mm above HRP and 20 mm in front of FRP. Complete the projections and obtain grade and bearing of line.
6	A line AB, 90 mm long, is inclined at 45 degree to HRP and its top view makes an angle of 60 degree to FRP. The end A is in HRP and 12 mm in front of FRP. Complete the projections.
7	A line AB, 80 mm long is inclined at 40 degree to FRP and its front view makes an angle of 60 degree to HRP. The end A is in FRP and 14 mm above HRP. Complete the projections.

8	A line AB of 75mm long is inclined at 40^0 to HRP and 30^0 to FRP. The end point 'A' is 20 mm from both reference planes. Complete the projections and find the bearing of line.
9	Point A of line AB, 60 mm long, is 12mm away from HP and VP and another point B is 45mm away from HP and VP. Draw the FV and TV of line AB. Determine the true inclination with HP and VP.
10	A line PQ carries FV length 50 mm and apparent inclination with HP is 45^0. The line carries a true inclination of 30^0 with VP. Complete the projection of line and determine its true inclination with HP.
Grade & Bearing: 4 Marks	
11	Complete the projections of line AB if i) its bearing is S 40^0 E w.r.t. A ii) its gradient is + 75% w.r.t. A iii) its top view length is 60 mm iv) Point A is 15mm from both HP and VP
12	Draw the projections of line AB if i) A is 15 mm away from HRP as well as FRP. ii) Bearing of line at B is N45^0 W. iii) Grade of the line is 70% minus w. r. t B. iv) FV length of line 70 mm.
13	Line AB 60 mm long has a bearing of N 45^0 E and a gradient of 100%. Draw FV and TV of line. Consider point 'A' 15 mm above HRP and 70 mm in front of FRP.
14	Draw projections of line RS if point 'R' is 10 mm from both the reference planes. Bearing of line w. r. t. 'S' is N 60^0 E. Grade of line is minus 60% w. r. t. 'S' front view length of 60 mm.
15	Draw projection of line MN if point 'M' is 15 mm away from both HRP and FRP. Bearing of the line w. r. t. 'N' is N50^0 E. Grade of line is – 70% w. r. t. 'N' front view length of the line is 60 mm.

Parallel Lines : 3 Marks	
16	Ref. Fig:1(A) : CD is parallel and equal to length AB. Complete the T.V. & F. V. of Line AB & CD
17	Ref. Fig:1(B) : Complete the projections of RS to be parallel to PQ and to have true length of 50 mm.
18	Ref. Fig:1(C) : Complete the projections of line PQ is parallel to RS. Find the true distance between the lines.
19	Ref. Fig:1(D) : Complete the projections of line PQ parallel to line AB, 25 mm away from it and 55 mm long.
20	Ref. Fig:1(E) : Line CD makes 30^0 with FRP and its TL is 30 mm, it is parallel to AB and 15 mm away from it. Draw the projections of the CD.
Perpendicular Lines : 3 Marks	
21	Ref. Fig:2(A) : Complete the projections, if line CD is perpendicular to AB where D lies on Line AB.
22	Ref. Fig:2(B) : Complete the projections, if Line RS perpendicular to LM where S lies on LM, Find TL of RS.
23	Ref. Fig:2(C) : Complete the projections, if line PQ 30 mm long which is perpendicular to AB where Q lies on Line AB.
24	Ref. Fig:2(D) : Complete the projections of Line ST, if it is perpendicular to RS.
25	Ref. Fig:2(E) : Complete the projections if BC is perpendicular to AB. Find TL of BC.

Intersecting & Skew Lines : 3 Marks	
26	Ref. Fig:3(A) : Find the angle between the line AB & CD.
27	Ref. Fig:3(B) : Find the angle between the lines RS & ST
28	Ref. Fig:3(C) : Line PM measuring 40 mm, is the angle bisector of angle QPR, Complete its projections.
29	Ref. Fig:3(D) : Complete the projections, if line PQ makes an angle of 60^0 with RS , where Q lies on RS.
30	Ref. Fig:3(E) : Complete the projections & state whether given lines are intersecting or not.
Profile Line : 3 Marks	
31	Ref. Fig:4(A) : Complete the projections a horizontal line MN intersects line AB
32	Ref. Fig:4(B) : Line RS parallel to line PQ & True length of Line RS is 40 mm, if the shortest distance between the lines is 25 mm. complete the projections.
33	Ref. Fig:4(C) : Complete the projections if KS is 25 mm long perpendicular to AB , point S lies on AB .
34	Ref. Fig:4(D) : Complete the projections of line PQ if its grade is positive 50%. Also find its TL.
35	Ref. Fig:4(E) : Line Rs meets line CD at S. Draw the projections of Line RS if it Makes 60^0 with CD.

Projections of Planes	
Three Stage Problems : 7 Marks	
36	ABCDE is a regular pentagonal plane of side length 30 mm. It is resting on side AB in HRP with the highest corner of the planes 25 mm above HRP. Draw the projections of the plane if the distance between the projectors of A and B is 15 mm.
37	Draw the projections of a regular hexagon of 25 mm side having one of its sides on the ground H.P and inclined at 30^o to the FRP and its surface making an angle of 45^o with the H.P.
38	A square ABCD of 50 mm side has one of its corners 'A' in the H.P. and surface inclined at 30^o with H.P. the top view of the diagonal passing through that corner is inclined to the V.P. by 45^o. Draw its projections.
39	An isosceles triangular plate of 50mm base and 75mm altitude appears as an equilateral triangle of 50mm in top view. Draw the projections of the plate if its 50mm long edge is on the H.P. & inclined at 45^o to V.P.
40	A hexagonal plane of 35 mm side is resting on one of its corners in HRP. The plane is inclined to HRP such that the opposite corner of the plane is 30 mm above HRP. Complete the projection when the diagonal passing through the corner makes 30^o to FRP.

Two Stage Problems : 4 Marks	
41	An isosceles triangle ABC having its base 40 mm and height 60 mm is resting on the VP on its base AB. Draw the projection of the plane when its surface is inclined to VP at an angle of 45°.
42	A semicircular plate of 60mm diameter has its straight edge in VP. Draw the projection of the plate when the surface of the plate makes 40° with VP.
43	A 30°-60° set square rests on its smallest side on FRP, which measures 60 mm long. The plane of the set square is inclined to FRP, such that its front view is an isosceles triangle. Complete the projections and find its inclination with FRP.
44	A rectangle of size 40 mm X 60 mm has its smaller side in HRP. It is inclined to HRP such that its top view appears as a square. Complete the projections and find its inclination with HP.
45	A pentagonal plane of base side 30 mm is resting on one of its corners in HP. The plane is inclined to HP by 40°. Complete the projections.
Objectives-Forwards Problems : 4 Marks	
46	Ref. Fig-2(A):Find strike and dip of given plane PQR.
47	Ref. Fig-2(B):Find strike and dip of given plane MNO.
48	Ref. Fig-2(C):Find strike and dip of given plane RST.
49	Ref. Fig-2(D):Find strike and dip of given plane RST.
50	Ref. Fig-2(E):Find strike and dip of given plane LMN.
Objectives-Reverse Problems : 4 Marks	
51	Ref. Fig-3(A): Complete the top view of a plane PQR such that its strike is $S40^0W$ and dip 36^0North westerly.
52	Ref. Fig-3(B): Complete the front view of plane ABC if it strikes N 40^0E wt A and Dips 40^0 North Westerly.
53	Ref. Fig-3(C): Draw top view of plane ABC having strike of $S60^0W$ and dips 45^0 SE.
54	Ref. Fig-3(D): Complete the top view of plane ABC if it strikes $S60^0$ W and dips 45^0 North Westerly.
55	Ref. Fig-3(E): Complete the Top View of plane ABC if its strike N45W w.r.t. C and Dips 50^0 North easterly.

Projections of Solids: 10 Marks	
56	A square prism side of base 35 mm and axis length 60 mm is kept on the HP on a corner of its base in such a way that its axis makes an angle of 30^o with both the HP and VP. Draw the projections of the prism.
57	A square pyramid, side of base 40 mm and axis length 65 mm is kept on HP on one of its base corners in such a way that its axis makes an angle of 30^o with the HP and 45^o with the VP. Draw the projection of the pyramid keeping the apex of the pyramid away from the observer.
58	A pentagonal prism (base side 35 mm and height 70 mm) is resting on HRP on one of its corners of base. The longer edge containing that corner is inclined at 45^o to HRP. The axis of the prism makes 30^o to FRP. Draw projections of solid.
59	A pentagonal pyramid of side of base 40 mm and axis height 70 mm is resting on one of its base corners in HRP. Solid is tilted such that, slant edge passing through the corner is inclined at 45^o to HRP. Complete the projection of solid when the top view of the axis makes 45^o to FRP.
60	A hexagonal pyramid base 40 mm side axis 100 mm long resting in H.P. on a corner of its base, with a slant edge making an angle of 30^o with H.P. & axis making an angle 30^o with V.P. Draw the projections of the pyramid.
61	A hexagonal prism of 30 mm side of base and 70 mm height has one of its rectangular faces in the VP and the edge of the base contained by that face makes an angle of 30^o with the HP. Draw the projections of the prism.
62	Right circular cone base diameter 60 mm and axis 75 mm long is resting on its circular ring in HP in such a way that one of the generators is normal to HP and the plan of its axis makes 45^o with the VP. Draw its projections.
63	A square pyramid has one of its corners in the VP such that the slant edge contained by that corner makes 30^o with HP and 40^o with VP. Draw its projections taking the apex away from the observer.

64	Draw the projection of a cube of side 40 mm is resting on one of its corners of base in such a way that one of its solid diagonal is parallel to HP and perpendicular to VP.
65	ABCD is a tetrahedron of 60 mm long edges. The edge AB is in the H.P. The edge CD is inclined at an angle of 30^o to the H.P. & 45^o to V.P. Draw the projections of the solid.
Sections of Solids : 10 Marks	
66	A hexagonal pyramid having 50 mm side and 100 mm long axis is lying on the HRP on one of its triangular faces, with axis parallel to FRP. it is cut by a section plane inclined at 30^0 to FRP and passing through center of base. Pyramid is cut such that the apex is retained. Draw TV, Sectional FV and also true shape of section
67	A pentagonal prism, side of base 25 mm & axis 60 mm long, is resting on one of its base edges on the ground such that its axis is parallel to FRP (VP) & inclined at 30^0 to HP. It is cut by a horizontal cutting plane passing through the highest corner of its base. Draw its FV sectional T.V and true shape of section.
68	A hexagonal prism has a face on the HP and the axis parallel to VP. It is cut by a vertical section plane passing through a point 25 mm on the axis from the base and 45^0 titled to VP. Draw its sectional front view and true shape of the section. The side of the base of the hexagonal prism is 30 mm and the height is 70mm.
69	Square pyramid edge of base 30 mm, axis height 50 mm rest on its base in the HP with one of the edge of base parallel to VP. A sectional plane which is the HT cuts the pyramid at an angle 45^0 to VP and is 6 mm away from axis of pyramid. Draw TV, sectional FV and true shape of section
70	A pentagonal pyramid, base 55 mm side and height 85 mm long has its base in HP with a side of base side perpendicular to VP. It is to be cut by a 60^0 auxiliary inclined plane and passes through a point on the axis 40mm from its base. draw front view, sectional top view, and true shape of section
71	ABCD is a tetrahedron of 70 mm long edges. The face ABC is on the H.P. with the edge AB perpendicular to V.P. The solid is cut by an A.I.P., in such a way that the true-shape of the section is a trapezoid of parallel sides 40 mm and 18 mm. Draw the

	projections of the solid, sectional plan and true shape of the section. Find the inclination of the cutting plane with the H.P.
72	A square pyramid of base side 50mm and axis length 70mm is (lying) resting on one of its triangular face on HP, with its axis parallel to V.P. It is cut by an AlP in such a way that it's true shape is a trapezium of sides 40 mm and 20 mm. Draw its Front View, Sectional Top View and True Shape.
73	A pentagonal pyramid of base 35 mm and height 70 mm is rests on its base in HP with one of its base side perpendicular to VP. It is to be cut by a section plane in such away that the true shape of section is equilateral triangle of the maximum side. Locate the section plane, draw sectional top view, true shape of section
74	A square pyramid of base side 50 mm and axis length 70mm is (lying) resting on one of its triangular face on HP, with its axis parallel to V.P. It is cut by an AlP in such a way that it's true shape is a trapezium of sides 40 mm and 20 mm. Draw its Front View, Sectional Top View and True Shape.
75	A square prism of base 40 mm and axis 70 mm long is lying on one of its lateral side on HP. It is being cut by an AIP in such a way that the true shape of section is a rhombus of longer diagonal 60 mm. Draw F.V., Sectional T.V. and true shape of section.
Orthographic Projection: 18 Marks	
76	Figure A: shows pictorial view of an object. Draw the following views: 1) Front View in Direction 'X' 2) Top View 3) Left Hand Side View
77	Figure B: shows pictorial view of an object. Draw the following views: 1) Front View in Direction 'X' 2) Top View 3) Left Hand Side View
78	Figure C: shows pictorial view of an object. Draw the following views: 1) Sectional Front View in Direction 'X' 2) Top View 3) Left Hand Side View
79	Figure D: shows pictorial view of an object. Draw the following views: 1) Sectional Front View in Direction 'X' 2) Top View 3) Left Hand Side View
80	Figure E: shows machine block. Draw the following views: 1) Sectional Front View in Direction 'X' 2) Top View 3) Left Hand Side View

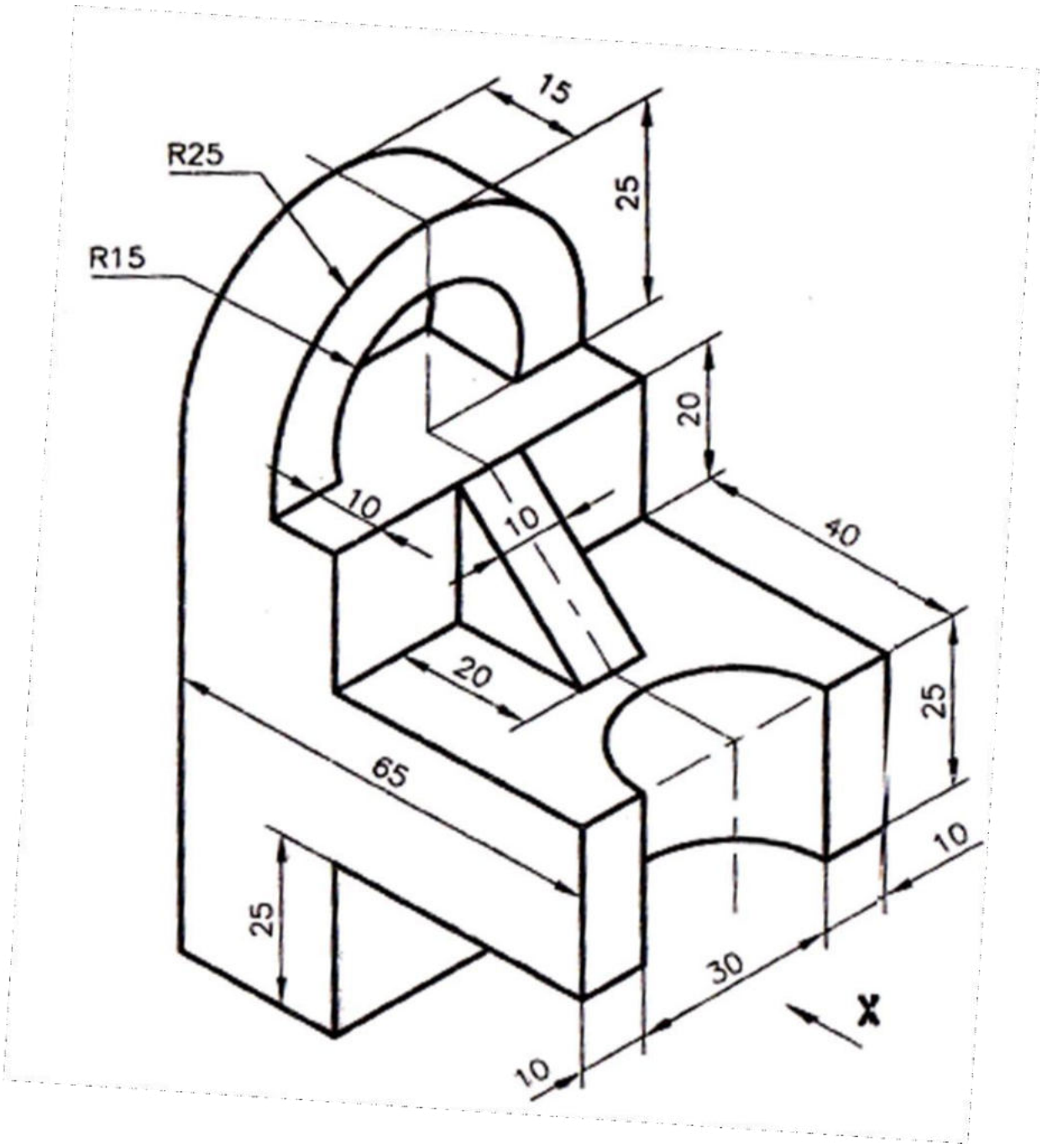


Fig: A

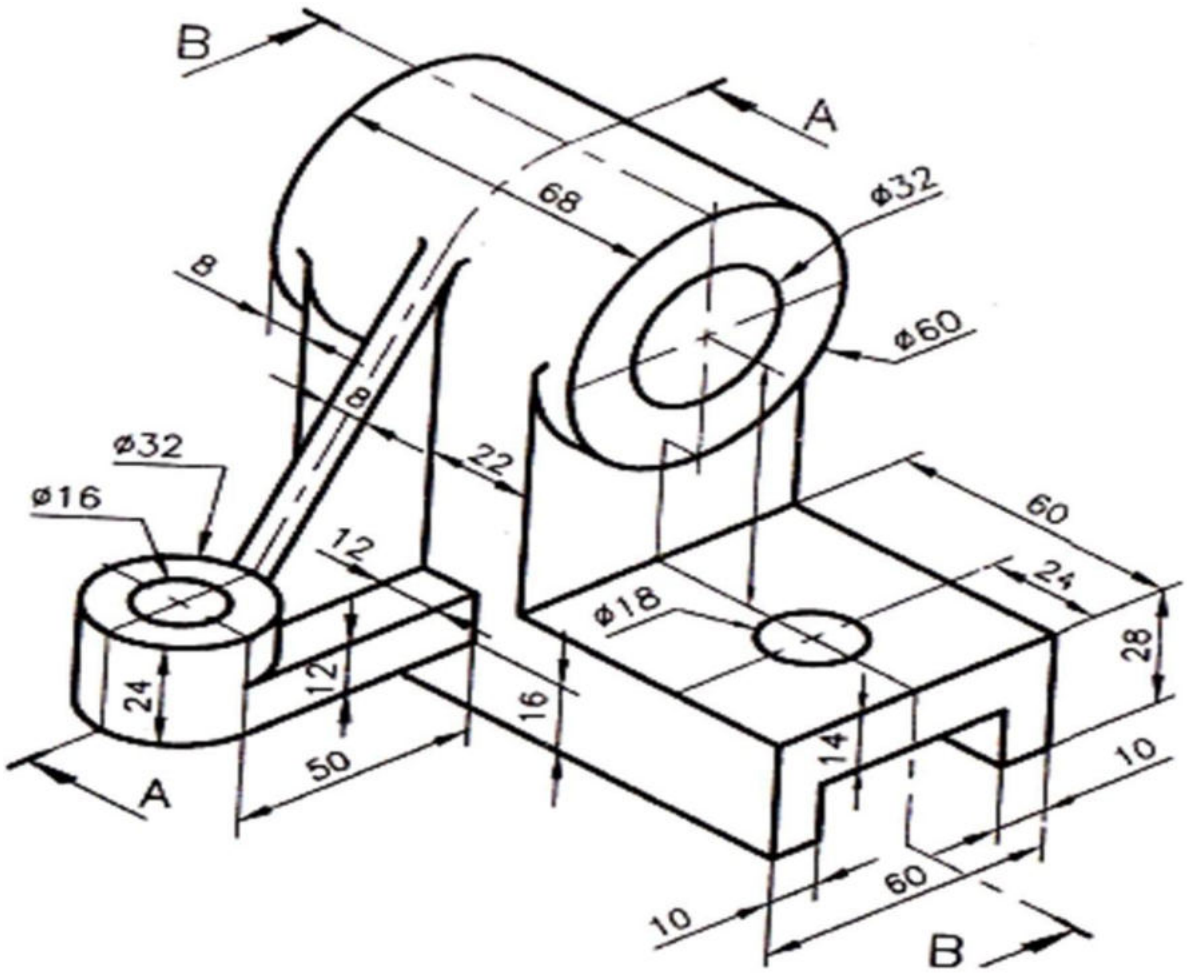


Fig: B

X

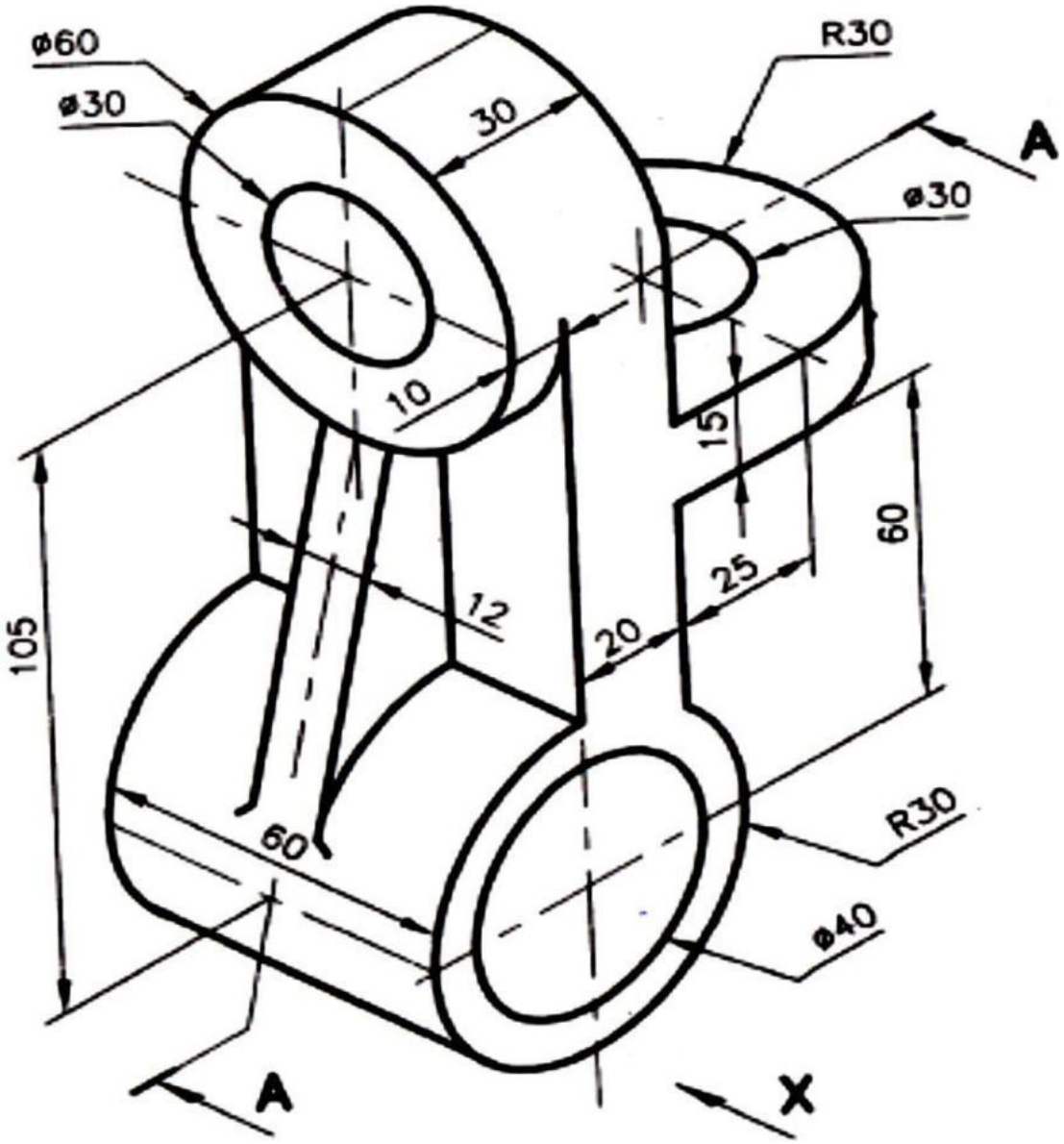


Fig: C

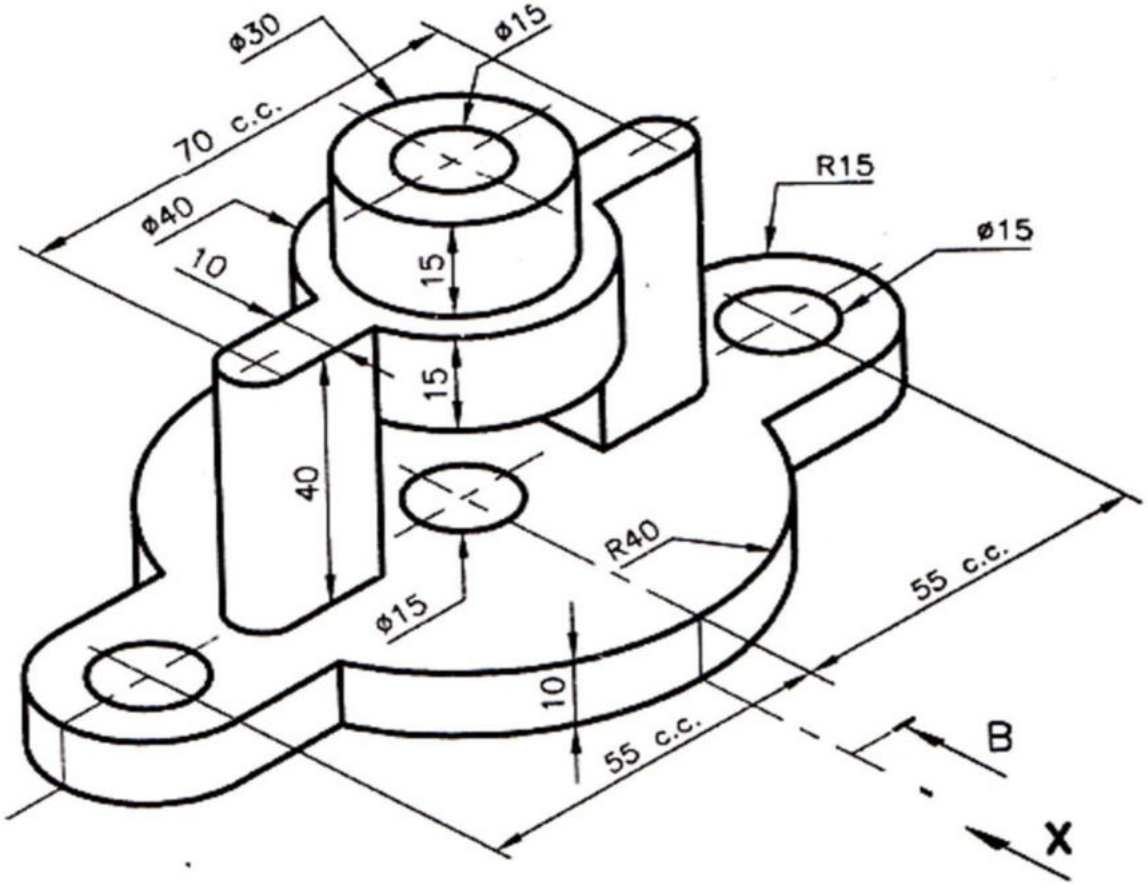


Fig: D

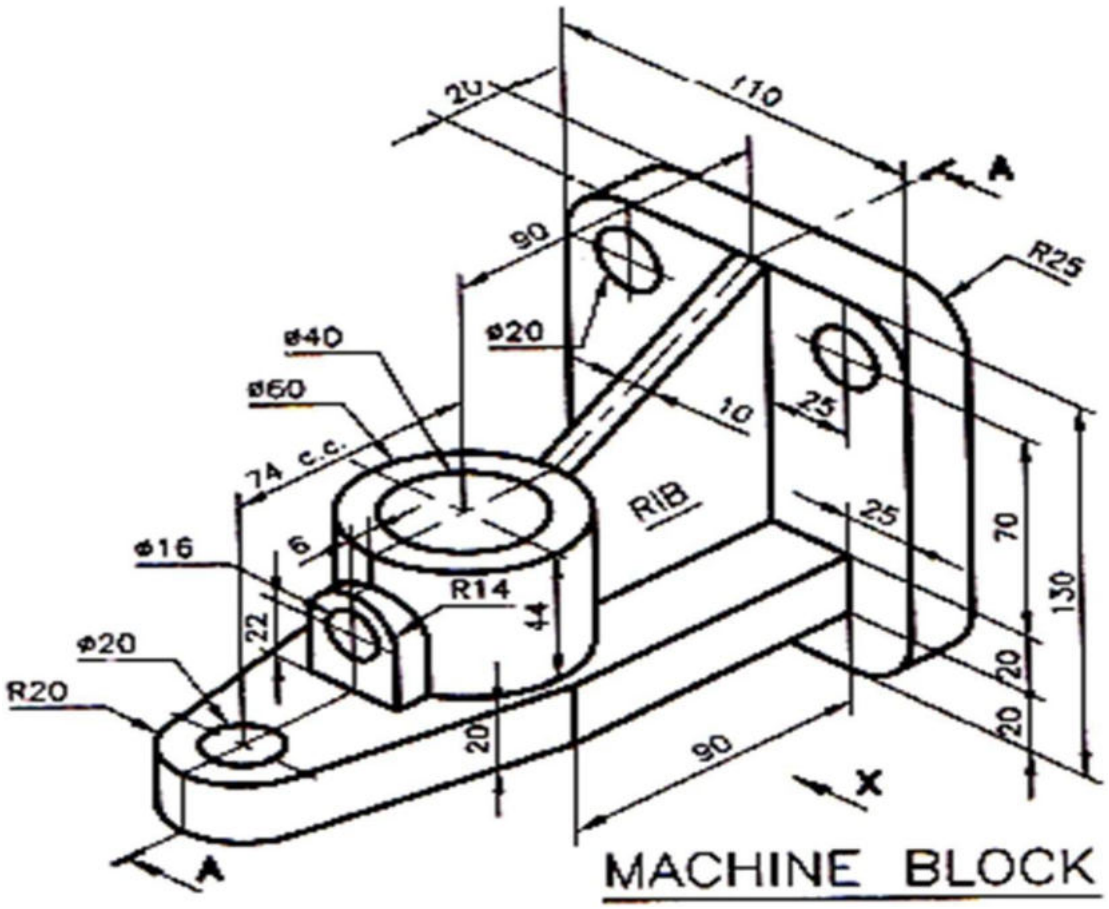
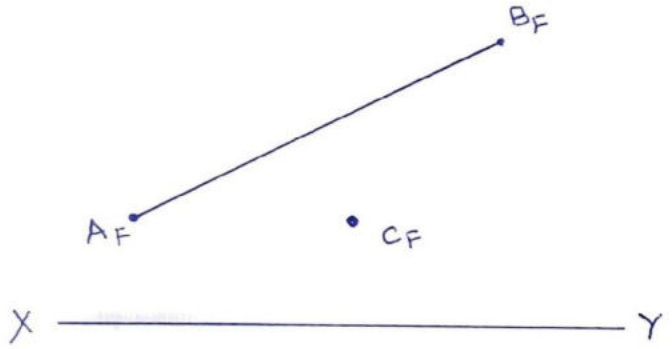
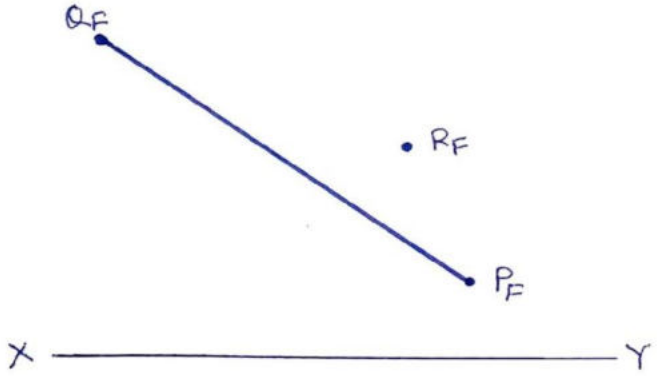

20
110
A
90
R25
ø40
ø20
ø60
10
25
74 c.c.
RIB
25
70
130
ø16
6
R14
44
22
ø20
R20
20
90
20
20
X
A
MACHINE BLOCK

Fig: E

* Parallel Lines:

Parallel Lines





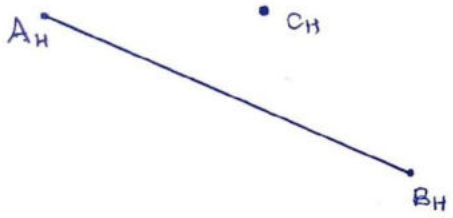


Fig: 1 (A)

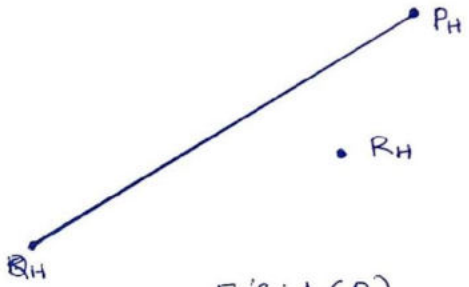
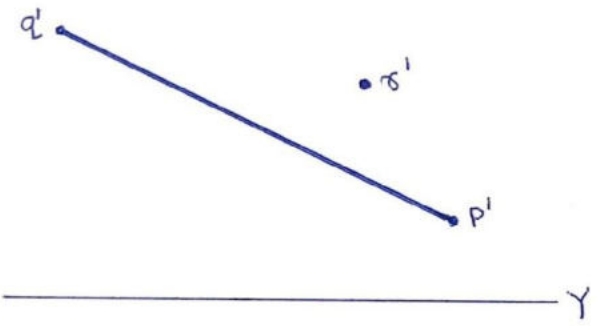
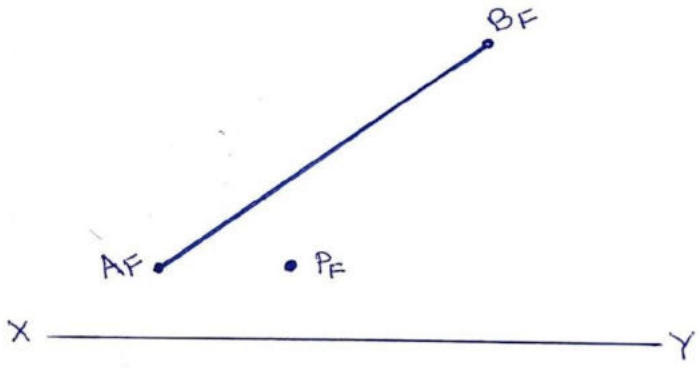


Fig: 1 (B)





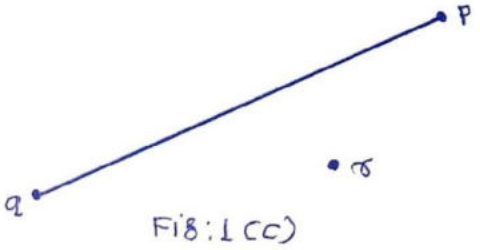


Fig: 1 (C)

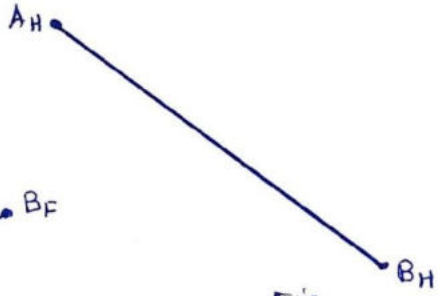


Fig: 1 (D)

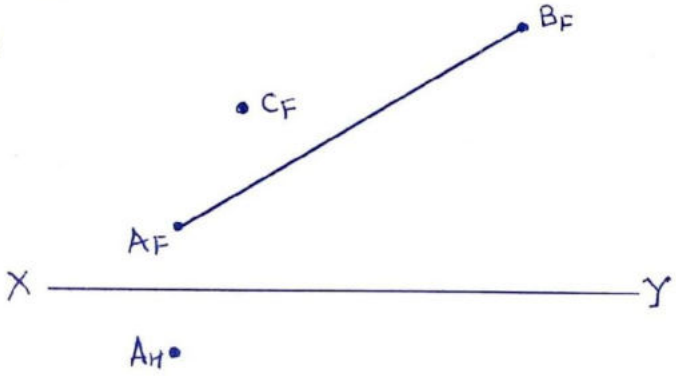
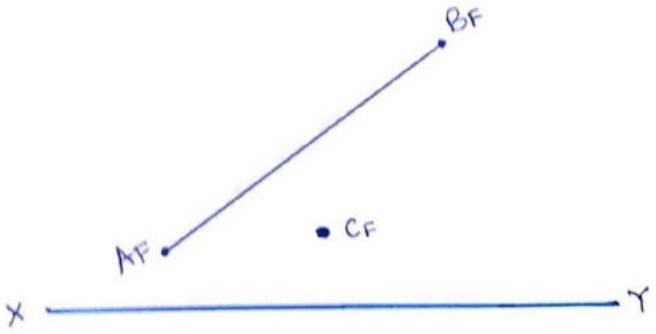
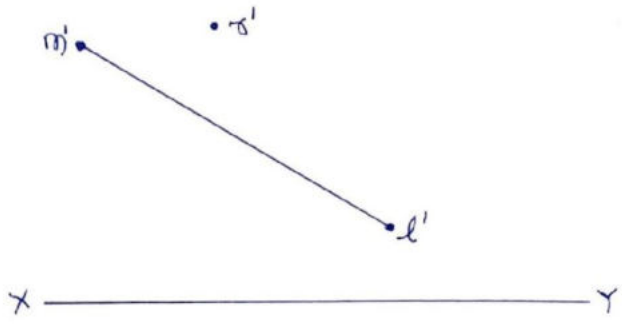


Fig: 1 (E)

* Perpendicular Lines:

Perpendicular Lines





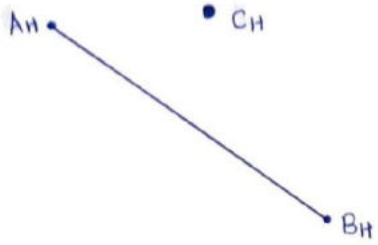


Fig: 2(A)

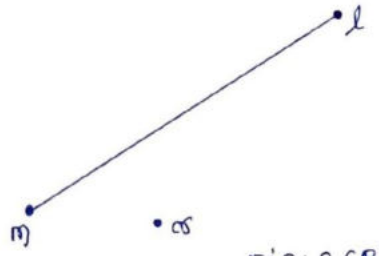
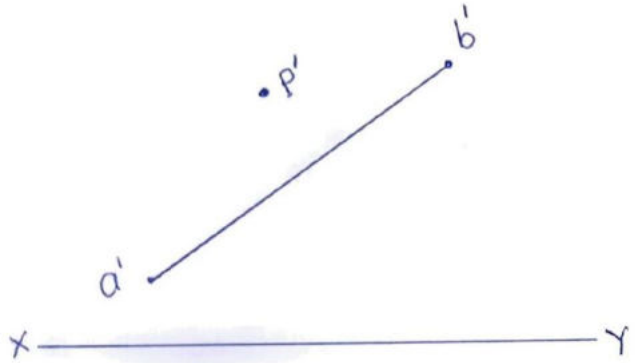
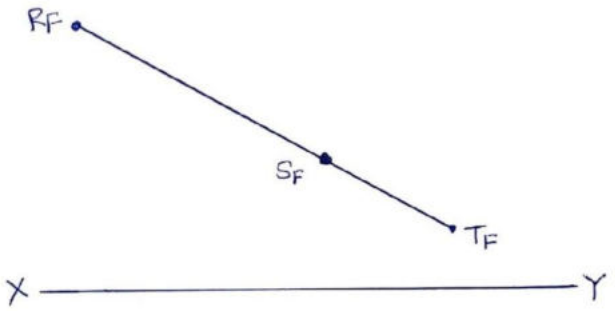


Fig: 2(B)





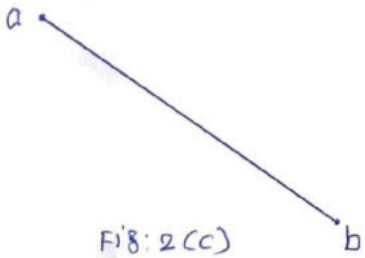


Fig: 2(C)

Fig: 2(D)

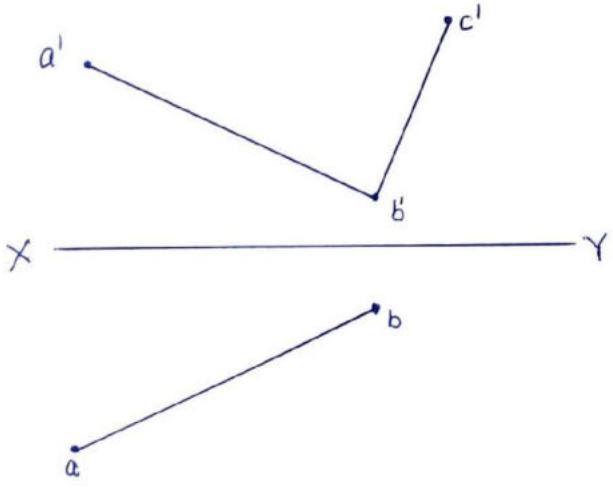
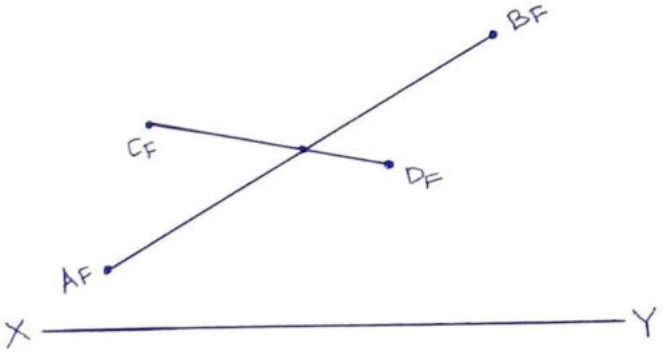


Fig: 2(E)

* Intersecting & Skew Lines:

Intersecting & Skew Lines



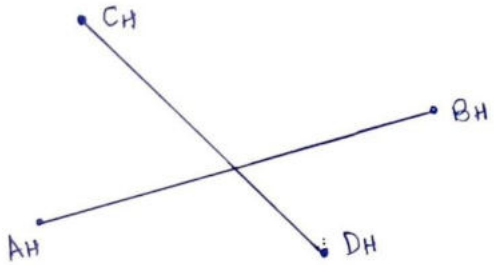
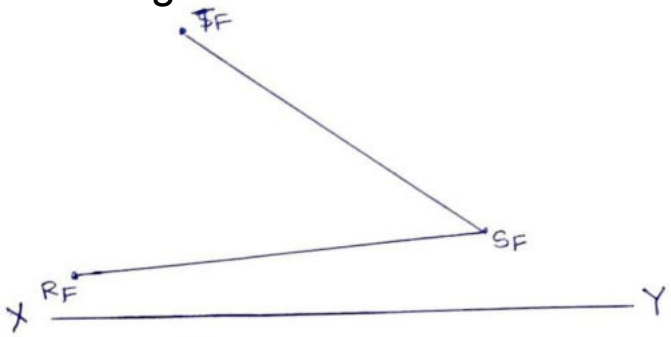


Fig: 3(A)



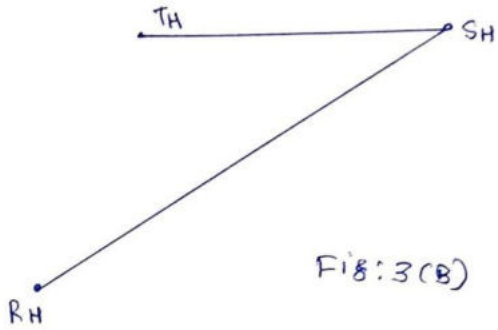
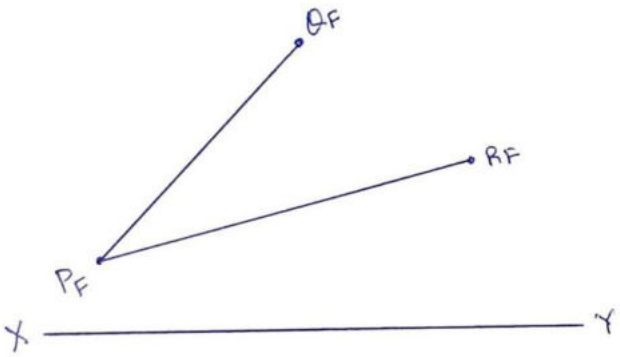
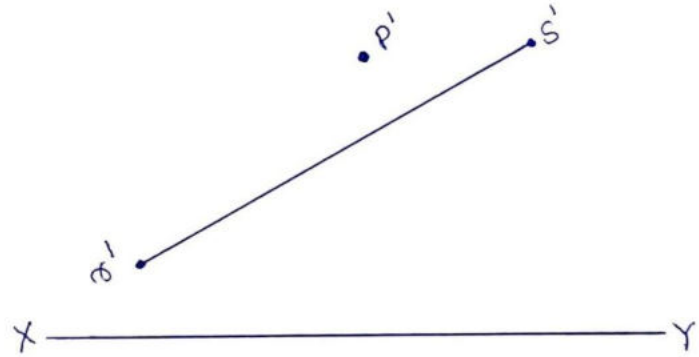


Fig: 3(B)





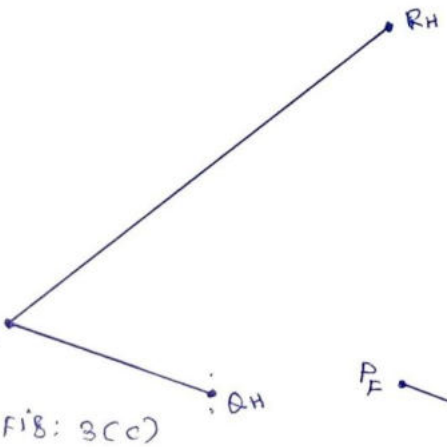
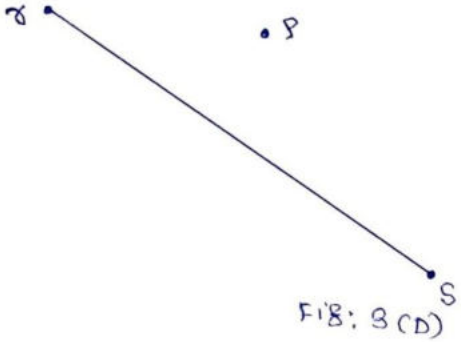


Fig: 3(C)



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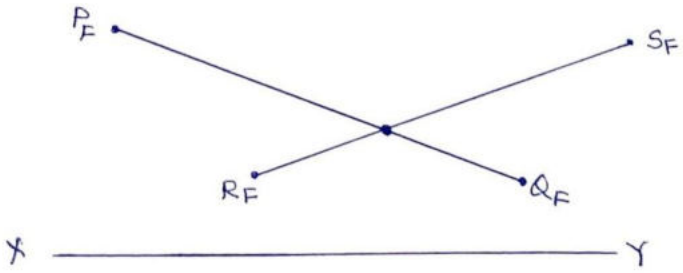


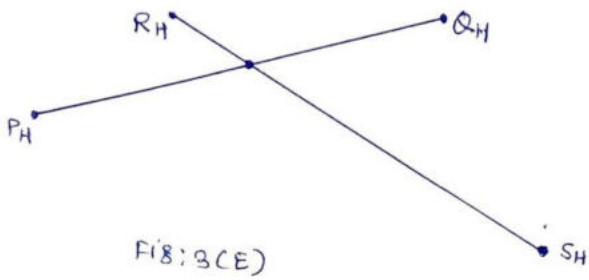
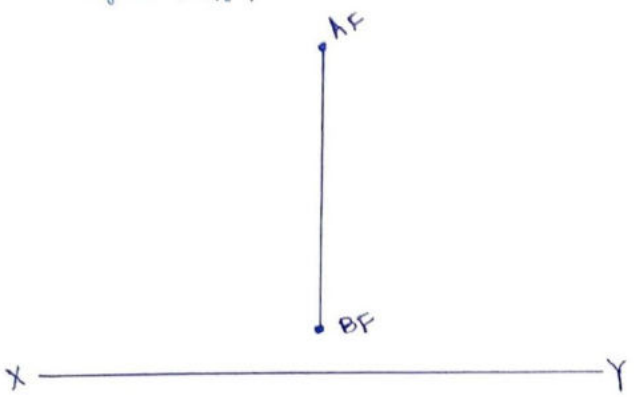


Fig: 3(E)

Profile Line

* Profile line:



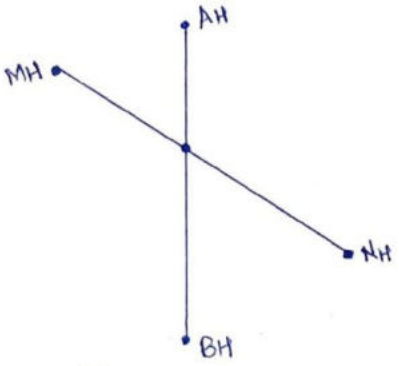


Fig: 4 (A)

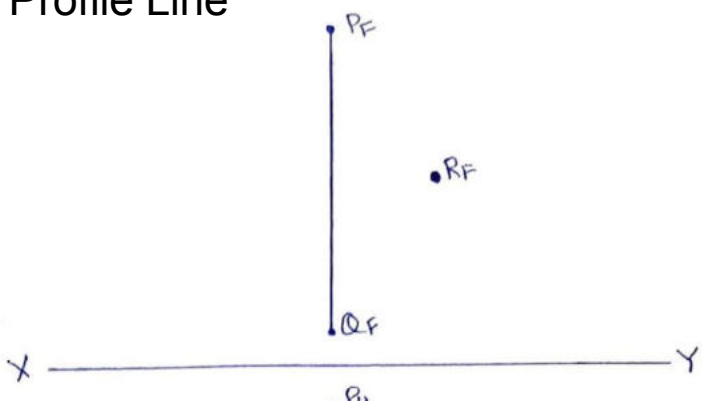
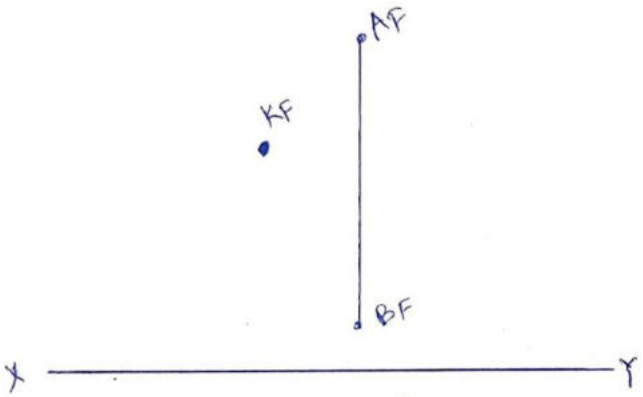


Fig: 4 (B)



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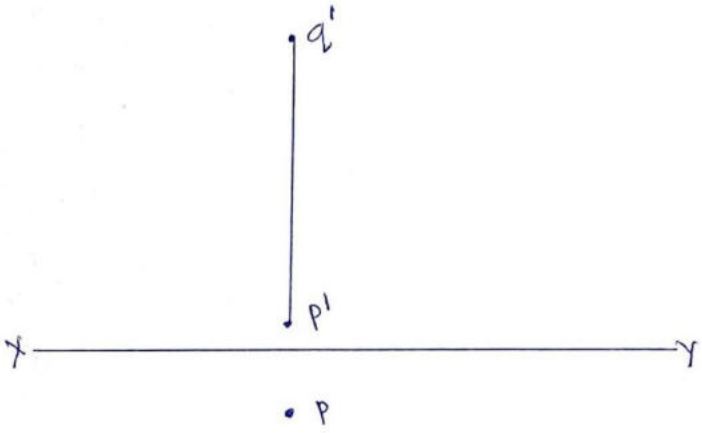


Fig: 4 (D)

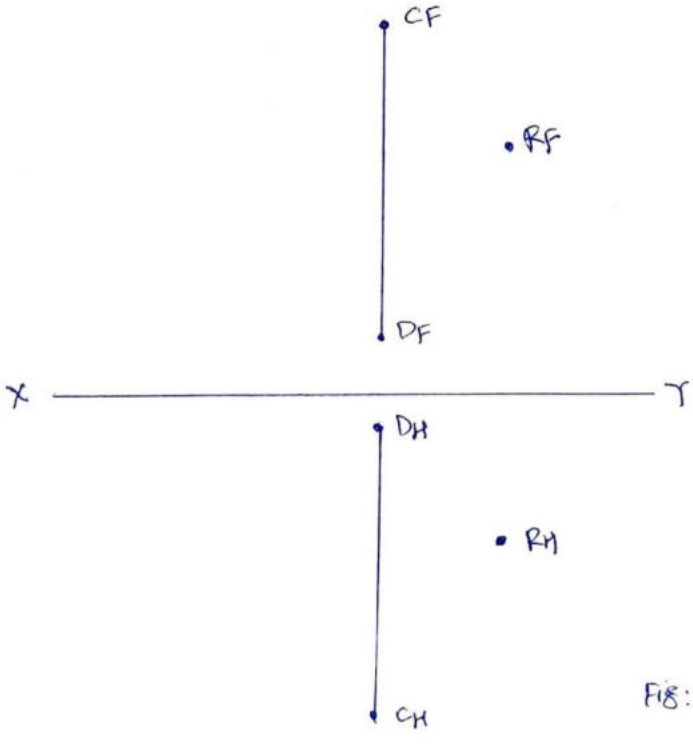
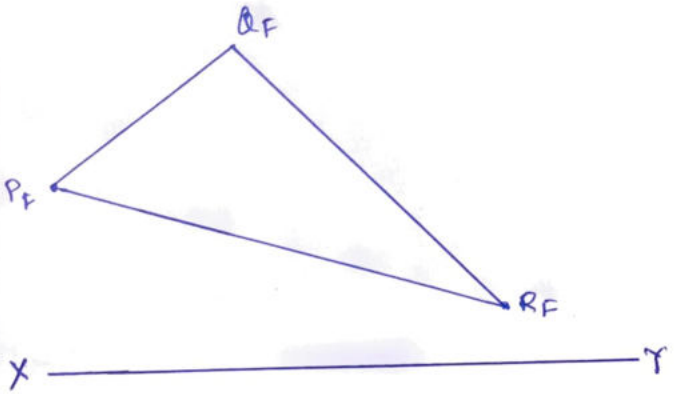


Fig: 4 (E)



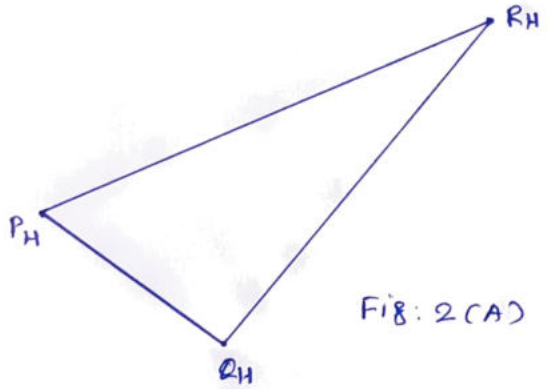
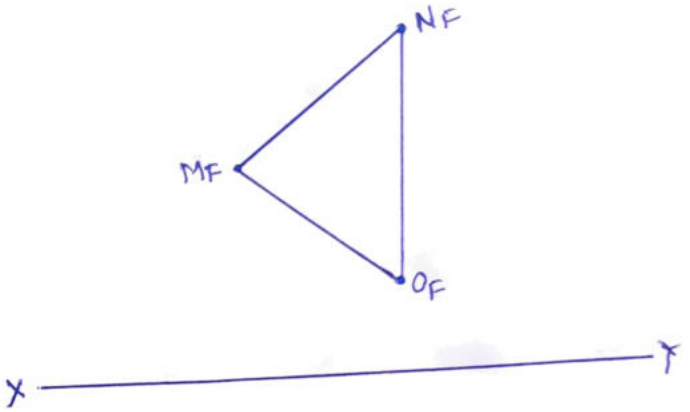


Fig: 2(A)



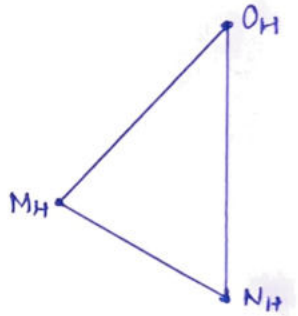
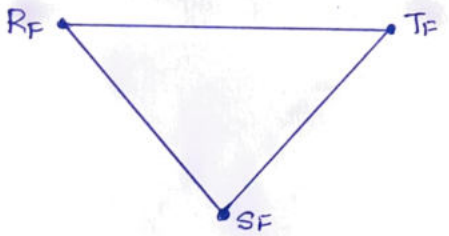
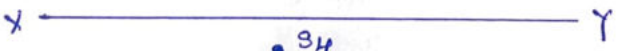


Fig: 2(B)





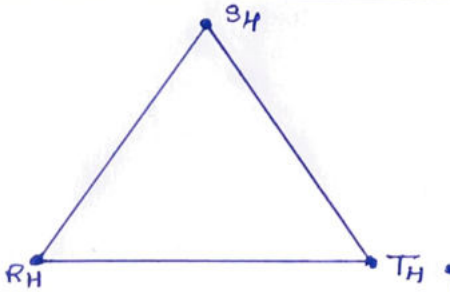
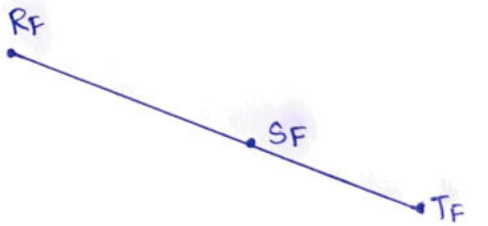


Fig: 2(D)



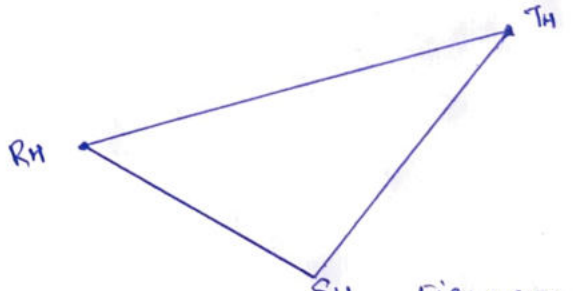
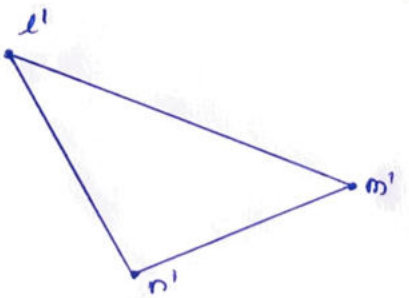


Fig: 2(C)



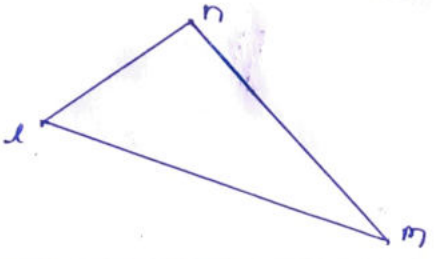
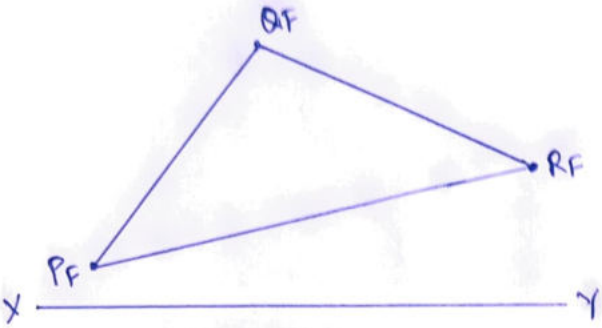


Fig: 2(E)



• RH

Fig: 3(A)

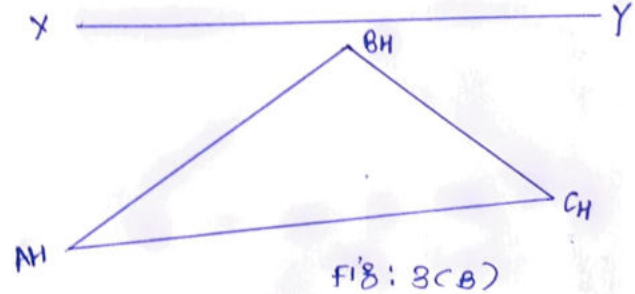
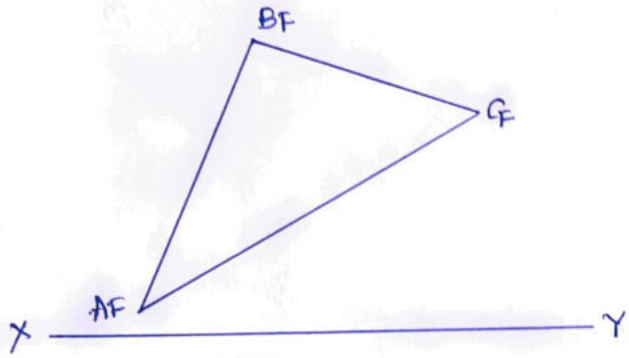


Fig: 3(B)



• CH

Fig: 3(C)

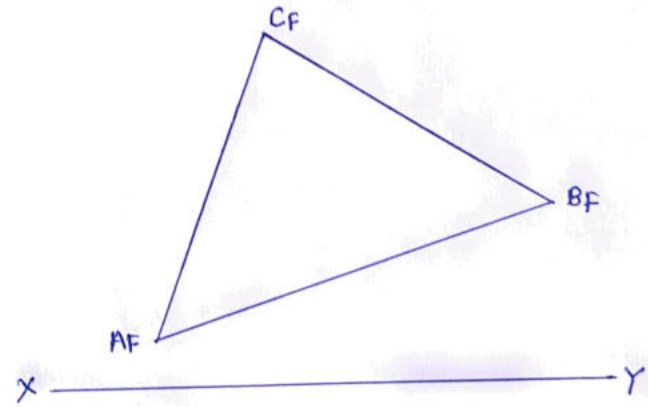
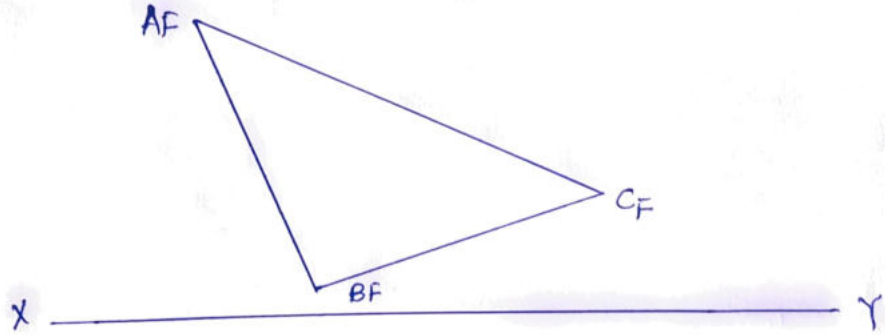


Fig: 3(D)

• BH



• CH

Fig: 3(E)

Final Year B.Tech. (Information Technology)
SET A

Subject: Elective V (Information Retrieval)

- **Short Answer Questions**
  1. Find Edit Distance between given words.
  2. Compare classic text retrieval models.
  3. Compare browsing models.
  4. Explain how probabilities are calculated in probabilistic model.
  5. Explain how weights are calculated in vector model.
  6. Explain how queries are expanded.
  7. Explain various patterns with examples.
  8. Show full evaluation and lazy evaluation for the given documents
  9. What are different measures of performance evaluation?
  10. How recall and precision are calculated as single value summaries?
  11. State advantages and disadvantages of vector model, booelan model and probabilistic model.
  12. What are the drawbacks of using precision and recall?
  13. Explain precision histogram.
  14. Explain Context Queries with examples.
  15. Compress given text using word-based model (spaceless words) and Huffman coding
  16. Compare data retrieval, text retrieval model and multimedia model.
  17. Explain terms intraclustering and interclustering.
  18. Explain Lexical analysis and issues related to it.
  19. How signature files are constructed and how queries are searched using signature files.
  20. Create suffix trie, suffix tree for given strings.
  21. Find pattern position in given string using given BM algorithm and show stepwise result.
  22. Find pattern position in given string using given KMP algorithm and show stepwise result.
  23. Find pattern position in given string using given BDM algorithm and show stepwise result.
  24. Find pattern position in given string using given Shift-OR algorithm and show stepwise result.
  25. Find pattern position in given string using given Brute Force algorithm and show stepwise result.
  26. Find whether string will be accepted given pattern, string and no of errors using dynamic programming.

27. Find whether string will be accepted given pattern, string and no of errors using automata.
28. Explain Pageranking algorithm.
29. Explain different techniques used in crawling.
30. What is metasearch engine with advantages and disadvantages?
31. Explain in detail HITS ranking algorithm.
32. What are the requirements of ideal query?
33. Explain different types of predicates.
34. How multimedia data is internally represented?
35. Explain multimedia query format.
36. Explain different types of predicates with examples.
37. How the degree of relevance of retrieved objects is calculated in multimedia query language?
38. Explain various ranking algorithm.
39. Construct Suffix Automata for given pattern.
40. State the difference between
    a. Text information retrieval and multimedia information retrieval
    b. Conventional data and multimedia data

- **Long answer questions**

1. What is document preprocessing. Explain its various steps.
2. Calculate Precision and Recall and plot a graph.
3. Find Logical View for each document using full text.
4. Define Information retrieval. Explain information retrieval process with neat diagram.
5. Create weight vectors using vector model for given documents and find relevant documents for given query.
6. Create weight vectors using Boolean model for given documents and find relevant documents for given query.
7. Explain MULTOS model in detail with example. How image data is dealt in MULTOS model.
8. Create signature file for given document and search given query using index.
9. Create inverted index for given document and search given query using index.
10. Create suffix tree and trie for given document and search given query using index.
11. Explain feature extraction and Lower-bounding with example.
12. How image analysis is carried out in MULTOS model?
13. How searching and browsing is combined in Webglimpse?
14. Explain GEMINI approach in searching two-dimensional color images.
15. Explain GEMINI approach in searching similar pattern in time series data.

16. Explain various web search engines algorithms with advantages and disadvantages
17. Find pattern position in given string using given sequential algorithm and show stepwise result.
18. Find whether string will be accepted given pattern, string and no of errors using approximate matching algorithm.
19. Why GEMINI approach is preferred? Explain dimensionality curse and cross talk problem with example.
20. Explain the three main aspects required to consider in designing multimedia query language.

Question Bank

Principles of Digital Communication (S.Y.BTech E &TC)SEM II

Section I

1. What is information and entropy? What are its units?
2. With the help of block diagram explain digital communication system in detail
3. Explain properties of Information theory I(X)?
4. Explain Joint Entropy and conditional entropy
5. Examples based on Entropy
6. Define the terms: Entropy; Rate of information, Mutual information, and Channel capacity
7. Differentiate analog & digital system
8. Explain Average & Mutual Information
9. Illustrate Redundancy & Channel capacity of communication system
10. With the help of neat sketch explain the term of quantization.
11. Describe uniform & non uniform quantization with neat sketch
12. Compare Uniform & non uniform quantization
13. What are the drawbacks of uniform quantization? How is it overcome in non-uniform quantization?
14. Explain the operation of delta Modulation system. What are its drawbacks
15. With the help of block diagram explain the working of Adaptive Delta Modulation.
16. Explain with the help of block diagram DPCM
17. Define Eye Pattern. With the help of neat sketch explain working of eye pattern
18. Explain Inter-symbol Interference of communication system
19. Explain types of Line Coding Techniques.
20. Compare Polar,Unipolar,Bipolar techniques
21. How is drawback of BPSK overcome in DPSK system? Explain in detail DPSK system
22. Compare ASK, FSK, & PSK
23. With the help of block diagram explain non coherent FSK.
24. Compare ASK, FSK, PSK and DPSK.
25. . Explain DPSK transmitter and receiver.
26. Explain Probability of error
27. Describe Equipment complexity concept in detail
28. Compare different digital modulation techniques
29. Write a note on comparison of digital modulation scheme with respect to bandwidth, power requirement, equipment complexity
30. Explain operation of FSK
31. Explain operation of PSK
32. Explain operation of FSK transmitter & receiver with the neat block diagram.

Section II

1. Explain M-ary wideband FSK system.
2. Draw the signal space representation of QPSK signals giving the relevant expressions.
3. . Write a note on QAM Transmitter.
4. What are the drawbacks of M-ary PSK signaling scheme for high value of M? Explain QAM modulation & demodulation
5. . Explain QAM modulator & demodulator in detail. What is advantage of QAM modulation technique?
6. Explain the operation of QPSK transmitter along with the diagram.
7. Derive an expression for probability of error for integrate and dump receiver
8. Write a note on matched filter receiver
9. What are different symbol synchronization methods? Explain in detail
10. What are different symbol frame synchronization methods? Explain in detail
11. List different carrier synchronization techniques. Explain carrier recovery
12. Explain correlator receiver in details
13. Compare correlator receiver with matched filter
14. Explain properties of linear block code
15. Examples on linear code
16. Explain systematic linear block codes
17. Explain parity check matrix
18. Describe Syndrome testing
19. Explain Generator matrix

B.TECH. CIVIL ENGINEERING

III-YEAR [II-SEMESTER]

CV-322: HYDRAULIC STRUCTURES & WATER POWER ENGINEERING

QUESTION BANK

A.Y. 2021-22

UNIT-I

1. Discuss various ways of classifying Reservoirs.
2. Explain various investigations required for reservoir planning
3. Discuss about various zones of storage in a reservoir.
4. Differentiate between:
   i. Storage Capacity and Yield of Reservoir
   ii. Mass Curve and Demand Curve
5. Discuss the methods of controlling sediments in a reservoir.
6. The lowest portion of the capacity-elevation curve of a proposed reservoir, draining 20 km^2 of catchment, is represented by following data:

Elevation in m	Capacity in ha. m
RL 600	24.2
602	26.2
604	30.3
606	36.8

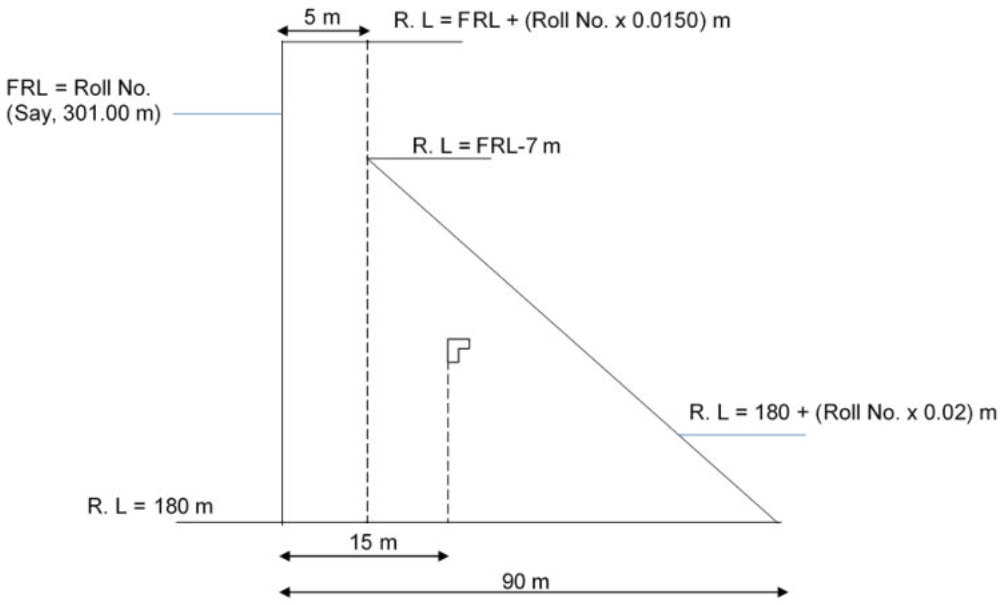
   The rate of silting for the catchment has been assessed to be 300 m^3/km^2/year. Assuming the life of reservoir to be 50 years
   a. Compute the dead storage and lowest sill level, if the main canal is 6 km long with bed slope 1 in 1000, and canal bed level at the tail end is RL 594.5 m. The FSD of the canal at the head is 80 cm. The crop water requirement assessed as 250 ha. m.
   b. If the dependable yield of the catchment is estimated to be 0.3 m, what will be the gross capacity of the reservoir?
7. A proposed reservoir has a capacity of 500 ha. m. The catchment area is 125 km^2, and the annual streamflow averages 12 cm of runoff. If the annual sediment production is 0.03 ha. m. /km^2, what is the probable life of the reservoir before its capacity is reduced by 10 % of its initial capacity by sedimentation. The

relationship between trap efficiency η (%) and capacity-inflow ratio (C/I) is as under:

C/I	0.01	0.02	0.04	0.06	0.08	0.1	0.2	0.3	0.5	0.7
η (%)	43	60	74	80	84	87	93	95	96	97

UNIT-II

1. Explain the modes of failure and stability requirements for a gravity dam.
2. Discuss the methods of carrying out the stability analysis of gravity dam.
3. Discuss the criteria for calculating the uplift force in gravity dam.
4. Derive the expression for principle stress and shear stress for a gravity dam.
5. Discuss the reason for deviation of practical profile of gravity dam.
6. Differentiate between high and low gravity dams.
7. Explain multiple step method of designing of gravity dam.
8. Explain the purpose, types and classification of the galleries used in a concrete gravity dam.
9. Explain various joints, keys and water seals provided in a gravity dam.
10. Examine the stability of the section shown in figure.



Unit weight of concrete $24\ kN/m^3$ and Unit Weight of Water as $9.81\ kN/m^3$.

11. What are various forces acting on arch dams?
12. Differentiate between 'Constant radius' and 'Constant angle' layouts of an 'Arch dam'.

13. What is the best value of angle for constant angle arch dam?

UNIT-III

1. Calculate the weight of Rip-Rap for an Earthen Dam section having a slope of 1:3 on U/S side and following data:
   i. Wind Velocity (V) = 120 km/h
   ii. Fetch (F) = 5 km
   iii. Stream flow velocity (v) = 2.5 m/sec
   iv. Specific Weight of stones to be used = 2750 kg/m^3
2. Explain the criteria for safe design of earthen dam and discuss preliminary design of earthen dam.
3. Explain necessity of providing Cut-off trench in an earthen dam. Also discuss the types and criteria of providing Cut-off Trench.
4. Enlist the methods of locating phreatic line in an earthen dam and discuss in detail.
5. Enlist and explain various methods of stability analysis of earthen dam.
6. Draw a cross section of a 'Zoned Embankment type Earth Dam' and discuss the significance of each component.

UNIT-IV

1. What are different kinds of spillways and how are they selected for individual conditions?
2. Design a suitable section for the overflow portion of concrete gravity dam having a D/S slope of 0.7:1 and a design discharge of 8500 cumecs. Consider height of the spillway as 105.00 m. Spillway length consists of 6 spans having pier length of 10 m each and thickness of each pier may be taken as 2.5 m.
3. A saddle siphon spillway has the following data. Full reservoir level = 485 m, Level of center of siphon outlet = 479.6 m, Highest flood level = 485.9 m, Highest flood discharge = 570 cumecs. If the dimensions of the throat of the siphon are: width = 4.2 m and height = 1.9 m, determine the number of siphon units required to pass the flood safely. The siphon is to discharge freely in air. Assume coefficient of discharge = 0.65.
4. Describe the working of volute syphon spillway.

5. Write down in detail about the classification of Energy Dissipators along with neat sketches of Basin appurtenances.

UNIT-V

1. Discuss briefly, the causes of failure of hydraulic structures, founded on pervious foundations.
2. What is meant by piping in a hydraulic structure? What are ill-effects of piping?
3. What are Kolhapur type weirs? Describe the operation policy of KT weirs over the water year.
4. What is the fundamental difference between Khosla's theory and Bligh's creep theory for seepage below a weir?
5. Write short notes on the following:
    a) Stream lines and Equipotential lines
    b) Exit gradient and its importance
    c) Design of inverted filters and launching aprons for weirs.

UNIT-VI

1. What is meant by canal regulation and what are the different canal regulation works?
2. Give an account of the investigations and surveys required while planning an irrigation canal project in each tract of land. Discuss the factors governing the selection of alignment of the main canal and its branches.
3. What the different types are of cross drainage works that are necessary on a canal alignment? State briefly the conditions under which each one is used.
4. Explain the following cross drainage works with sketches :
    i. Aqueduct
    ii. Level Crossing.
5. What is meant by Canal escapes? How do they help in protecting the adjoining areas against flooding due to some breach in the canal embankment?

UNIT-VII

1. Explain how do the following assist in river control:
    i. Spurs
    ii. Groynes
    iii. Guide bunds
2. What is meant by water-logging? What are its ill effects? Describe some anti-water-logging measures with suitable sketches.
3. Write short notes on the following:
    i. High water, low water and mean water training.
    ii. Use of Levees for protecting cities from floods.
4. What is the purposes of a groyne as a river training structure?
5. Which category of river training work deals with flood control?

UNIT-VIII

1. Distinguish clearly between run-off river Hydropower plants and storage type hydropower plants.
2. Define the following:
    i. Normal Water Level (NWL)
    ii. Minimum Water Level (MWL)
    iii. Load Factor
    iv. Demand Factor
    v. Utilization factor
3. The load on a hydel plant varies from a minimum of 10,000 kW to a maximum of 35,000 kW. Two turbo-generators of capacities 22,000 kW each have been installed. Calculated:
    i. Total installed capacity of plant
    ii. Plant factor
    iii. Maximum demand
    iv. Load factor
    v. Utilization factor
4. A runoff river plant has a installed capacity of 15000 kW and operates at 15 % load factor when it serves as a peak load station. What should be the minimum

discharge in the stream so that it may serve as a base load station? The plant efficiency may be taken as 75 % when working under a head of 20 m. Also calculate the maximum load factor of the plant when the discharge in the stream is 20 m^3/s.

5. A run-off river plant is installed on a river having a minimum flow of $15\ m^3/sec$. If the plant is used as a peak load plant operating only for 6 hours daily, compute the firm capacity of the plant:
    a) Without pondage
    b) With pondage but allowing 10 % water to be lost in evaporation and other losses.

    Head at the plant is 16 m, and the plant efficiency may be assumed as 80%.

6. The average monthly inflow (cumecs) of a rivulet are 45, 20, 30, 70, 40, 10, 100, 120, 80, 65, 55, 50 in the months of January thru December in a year. Draw flow-duration curve. Determine:
    a) Firm power
    b) Power at 90 %
    c) 50 % dependability
    d) Storage required at 50 % water availability

    Capacity of standby thermal plant for the same, the storage being not available. Assume plant efficiency 80 % and net head 30 m.

7. The runoff data of a river are 240, 200, 100, 300, 250, 150, 700, 500, 350, 275, 125, 325, 280, 400, 375, 390, 320, 140, 130 cumecs. Determine 75% dependable discharge for the power generation.

8. Determine the economical diameter of penstock pipe 500 m long to carry water to a turbine having output of 1000 kW at 90 % efficiency against a head of 150 m. Assume f=0.023.

Civil B.Tech. III Sem VI (w.e.f. Nov 2020) New CBCS
Design of Concrete Structures I

SECTION –I

1. A beam 250 mm x 550 mm effective is subjected to a factored moment of 320 kNm. Determine the area of steel required. Use M_{20} concrete and Fe_{415} steel. Assume d' = 50mm. **08**

2. A singly reinforced beam 300 mm X 700 mm is subjected to a bending moment of 145kNm. Determine the area of reinforcement if M_{20} concrete and Fe $_{415}$ steel is used. Take effective cover as 40 mm. **08**

3. A rectangular section of effective size 300 mm x 450 mm is used as a simply supported beam for effective span 6.5 m. What maximum udl can be allowed on the beam, if the maximum percentage of steel is provided, only on tension side? Use M_{20} concrete and Fe $_{415}$ steel. Determine the amount of steel to be provided. **08**

4. A rectangular section of effective size 300 mm x 450 mm is used as a simply supported beam for effective span 6 m. What maximum udl can be allowed on the beam, if the maximum percentage of steel is provided, only on tension side? Use M_{20} concrete and Fe $_{500}$ steel. Determine the amount of steel to be provided. **08**

5. A singly reinforced beam 230 mm X 450 mm is reinforced with 4-bars of 16mm Φ with an effective cover of 50mm. Effective span of the beam is 5m. Assuming M_{20} concrete and Fe 415 steel, determine the udl, that can be carried by the beam in addition to its self weight. **08**

6. Design a rectangular beam of section 230 mm X600 mm of effective span 5.2 m. The effective cover provided is 50 mm. The superimposed load on the beam is 52 kN/m. Use M_{25} and Fe_{415} steel. **10**

7. A rectangular reinforced concrete beam is simply supported on two masonry walls 230 mm thick and 6.2 m apart. The beam is carrying an imposed load of 16 kN/m. Design the beam. Use M_{25} concrete and Fe_{415} steel. **10**

8. Design a rectangular beam of section 230 mm x 600 mm of effective span 6.2 m. Effective cover for reinforcement should be kept as 50 mm. Imposed load on the beam is 42 kN/m. Concrete used is M_{25} and steel is Fe_{415}. **10**

9. Design a rectangular beam of section 230mm X600 mm of effective span 6.5 m. The effective cover provided is 50 mm. The beam is carrying a imposed load of 55 kN/m. Design the beam. Use M_{25} and Fe_{415} steel. **10**

10. Design a simply supported rectangular beam 300 mm wide to carry an imposed load of 25kN/m. The clear span of the beam is 4 m. The bearing at each end is 300mm.

Use M_{20} concrete and Fe $_{500}$ steel. **10**

11. Design a cantilever slab for an overhang of 1.3m. The imposed load on slab consists of 2 kN/m^2 including floor finish. Use M_{20} concrete and Fe $_{415}$ steel. **10**

12. Design a reinforced concrete slab for a room of clear dimension 4 m X 5m . The slab is supported all around on the wall of width 300mm. The slab has to carry a live load of 4.5 kN/m^2 with floor finish. Use M_{20} concrete and Fe_{415} steel. Assume corners are held down. **10**

13. Design a simply supported roof slab for a room 7.5 m x 3.5 m clear size. The slab is carrying an imposed load of 3.5 kN/m^2. Use M_{20} concrete and Fe_{415} steel. **10**

14. A hall has clear dimension 3 m x 9 m. with wall thickness 230mm. The live load on the slab is 4 kN/m^2 including floor finish. Use M_{20} grade concrete and Fe $_{500}$ steel, design the slab. **10**

15. Design a reinforced concrete slab for a room of clear dimension 3.6 m X 5.5m . The slab is supported all around on the wall of width 300mm. The slab has to carry a live load of 3kN/m^2 and floor finish 1kN/m^2. Use M_{20} concrete and Fe_{415} steel. Assume corners are held down. **10**

16. Design edge beam for a slab having clear span of beams 7m. The centre to centre distance of beam is 3.5m. Live load =4.8 kN/m^2**.** Use M_{25} and Fe $_{415}$ steel. **10**

17. A T- beam slab floor has 125 mm thick slab forming part of T-beams which are of 8.2 m clear span. The end bearings are 450 mm thick. Spacing of T- beams is 3m. The live load on the floor is 3 kN/m^2 . Design one of the intermediate beam. Use M_{25} concrete and Fe_{500} steel. **10**

18. Design a T-beam of flange 700 mm x 100 mm and web 200 mm x 300mm. The beam is subjected to an ultimate moment of 350 kN/m.. Use M_{25} concrete and Fe_{500} steel. **10**

19. T- beam slab floor has 150 mm thick slab forming part of T-beams which are of 10 m clear span. The end bearings are 300 mm thick. Spacing of T- beams is 3.2 m. The live load on the floor is 4 kN/m^2 (including floor finish). Design one of the T-beam using M_{25} concrete and Fe_{500} steel. **10**

20. Design edge beam for a slab having clear span of beams 7m. The centre to centre distance of beam is 3.5m. Live load =4.5 kN/m^2**.** Use M_{25} and Fe $_{415}$ steel. **10**

SECTION-II

21. Design the reinforcement for a short axially loaded square column of size 420 mm x 420 mm to support a load of 1550 kN. Use M_{20} concrete and Fe_{500} steel. **08**

22. Find the ultimate load carrying capacity and allowable load for a short column of size 500 mm x 500 mm. The column is reinforced with 4-25 mm diameter bars. Use M_{20} concrete and Fe_{500} steel. Assume $\mathbf{e}_{min} < 0.05$. **08**

23. Find the area of steel required for a short reinforced concrete column 400 mm x 400mm to carry an axial load of 1300 kN. Use M_{20} concrete and Fe_{415} steel. **08**

24. Find the area of steel required for a short reinforced concrete column 450 mm x 450mm to carry an axial load of 13500 kN. Use M_{20} concrete and Fe_{500} steel. **08**

25. Find the area of steel required for a short reinforced concrete column 400 mm x 400 mm to carry an axial load of 1000kN. Use M_{20} concrete and Fe_{500} steel. **08**

26. Determine reinforcement required for a beam size 450 mm x 400 mm subjected to shear force of 30 kN, torsion of 25 kN.m and bending moment of 50kN.m Use M_{20} concrete and Fe $_{415}$ steel. **10**

27. Determine reinforcement required for a beam size 300 mm x 600 mm subjected to factored bending moment of 120 kNm, factored shear force 90 kN and factored torsional moment of 48 kNm. Use M_{20} concrete and Fe $_{500}$ steel. **10**

28. Determine reinforcement required for a beam size 230 mm x 600 mm subjected to shear force of 65kN, torsinal moment of 35 kN.m and bending moment of 85 kN.m Use M_{20} concrete and Fe_{500} steel. **10**

29. Determine reinforcement required for a beam size 230 mm x 600 mm subjected to shear force of 62 kN, torsinal moment of 38 kN.m and bending moment of 82 kN.m Use $_{M20}$ concrete and F_{e500} steel. **10**

30. Determine reinforcement required for a beam size 230 mm x 600 mm subjected to shear force of 60kN, torsinal moment of 35 kN.m and bending moment of 80 kN.m Use M_{20} concrete and Fe $_{500}$ steel. **10**

31. Design a three span continuous beam of effective span of 5.2 m each to carry a live load on slab 3.5kN/m^2 including its self weight. Assume the thickness of slab 125

mm. Use M_{25} concrete and Fe_{500} steel.
10

32. Design a continuous rectangular beam of span 7m to carry a dead load of 12 kN/m and a live load of 17 kN/m. The beam is continuous over more than 3 spans and is supported by columns. Use M_{25} concrete and Fe_{500} steel. **10**

33. Design a three span continuous beam of span of 5.5 m each to carry a live load on slab 4 kN/m^2 including its self weight. The centre to centre distance between the continuous beams is 3.5 m. Assume the thickness of slab 120mm. Use M_{25} concrete and Fe_{500} steel.
10

34. Design a rectangular beam, continuous over four column supports of effective 6.2 m. The beam is subjected to an imposed load of 15 kN/m Use M_{25} concrete and Fe_{500} steel. **10**

35. Design a continuous rectangular beam of span 7m to carry a dead load of 14 kN/m and a live load of 16 kN/m. The beam is continuous over more than 3 spans and is supported by columns. Use M_{25} concrete and Fe_{500} steel.
10

36. Design a circular column to carry factored load of 2420 kN. Provide helical reinforcements. Use M_{25} concrete and Fe_{415} steel. **10**

37. a) Design a circular column of diameter 400 mm with helical reinforcement subjected to a load of 1150 kN. Use M_{25} concrete and Fe_{415} steel. The column has unsupported length of 3.2 m and is effectively held in position at both ends but not restrained against rotation.
07

b) Write an "Interaction diagrams'' for column stating their salient features. **03**

38. Design a circular column of diameter 400 mm subjected to a load of 1210 kN. The column is having spiral ties. The column is 3 m long and is effectively held in position at both ends but not restrained against rotation. Use M_{25} concrete and Fe_{415} steel. **10**

39. Design a circular column of diameter 400 mm subjected to a load of 1200 kN. The column is having spiral ties. The column is 3.2 m long and is effectively held in position at the both ends but not restrained against rotation. Use M_{20} concrete and Fe_{500} steel. **10**

40. Design a circular column of diameter 400 mm subjected to a load of 1220 kN. The column is having spiral ties. The column is 3 m long and is effectively held in position at both ends but not restrained against rotation. Use M_{25} concrete and Fe_{415} steel. **10**

41.

Civil Engineering

Third Year Part II (Semester VI)

Subject: Principles of Management and Quantitative Techniques. B Tech III Sem VI (w.e.f.Nov.2020)

SECTION I

1. What are the various functions of Management?
2. What is planning? Explain the steps involved in planning.
3. What are different types of plans? Explain in brief
4. What is "MBO"? Describe the benefits and weakness of MBO.
5. What is "Management by Objective (MBO)"? What are the steps involved in MBO? Mention its benefits
6. What is decision making and explain the process of decision making that affects the efficiency of the business decisions?
7. Explain in brief "Organization". State type of organization structures with sketch along its advantages and disadvantages.
8. Explain with example "Line and Staff organization"
9. What are the types of organization structure? Explain any two of organization structure in details with neat sketch
10. A factory manufactures two products A and B. To manufacture one unit of A, 1.5 machine hours and 2.5 labour hours are required. To manufacture product B, 2.5 machine hours and 1.5 labour hours are required. In a month, 300 machine hours and 240 labour hours are available. Profit per unit for A is Rs. 50 and for B is Rs. 40. Formulate as LPP.
11. A company manufactures two products A and B. Both products are processed on two machines M1 & M2. M1 M2 A B 6 Hrs/Unit 4 Hrs/Unit 2 Hrs/Unit 4 Hrs/Unit Availability 7200 Hrs/month 4000 Hrs/month Profit per unit for A is Rs. 100 and for B is Rs. 80. Find out the monthly production of A and B to maximise profit by graphical method. Formulation as LPP and solve it by Graphical Method.

    X1 = No. of units of A/Month

    X2 = No. of units of B/Month

    Max Z = 100 X1 + 80 X2

    Subject to constraints:

    $6 X1 + 4 X2 \leq 7200$

    $2 X1 + 4 X2 \leq 4000$

    $X1, X2 \geq 0$

Civil Engineering

Third Year Part II (Semester VI)

Subject: Principles of Management and Quantitative Techniques. B Tech III Sem VI (w.e.f.Nov.2020)

12. The Company has three plants located throughout a state with production capacity 50, 75 and 25 gallons. Each day the firm must furnish its four retail shops R1, R2, R3, & R4 with at least 20, 20 , 50, and 60 gallons respectively. The transportation costs (in Rs.) are given below.

	Retail				
Company	R1	R2	R3	R4	Supply
P1	3	5	7	6	50
P2	2	5	8	2	75
P3	3	6	9	2	25
Demand	20	20	50	60	

The economic problem is to distribute the available product to different retail shops in such a way so that the total transportation cost is minimum?

13. Three jobs A B C are to be assigned to three machines X Y Z. The processing costs are as given in the matrix shown below. Find the allocation which will minimize the overall processing cost.

		Machines		
		X	Y	Z
Job	A	19	28	31
	B	11	17	16
	C	12	15	13

14. Write the dual of the following LPP

Maximize Case:

$$Z = 3x_1 + 4x_2 + 7x_3$$

Subjected to Constraints:

$$x_1 + x_2 + x_3 \leq 10.$$
$$4x_1 - x_2 - x_3 \geq 15.$$
$$x_1 + x_2 + x_3 = 7.$$
$$x_1, x_2 \geq 0,\ x_3 \text{ unrestricted.}$$

15. A product is been replaced by three changes like high Change S1, moderate change S2 and low change S3. There three possibility of state of nature high demand in sales N1, no change in sales N2 and decrease in sales N3. ($\alpha = 0.7$)

Strategies	States of Nature		
	N1(0.3)	N2(0.5)	N3(0.2)
S1	700000	300000	150000
S2	500000	450000	0
S3	300000	300000	300000

Select the optimal strategy on the basis of each of the following criteria.

1) Maximin Criteria

Civil Engineering

Third Year Part II (Semester VI)

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2) Maximax Criteria
3) Laplace Criteria
4) Hurwicz Criteria.
5) Savage Criteria.
6) EMV
7) EOLC

16. Make a decision using the Risk Principles. (EMV and EOLV)

Alternative	**Growing**	**Stable**	**Declining**
Bonds	40	45	5
Stocks	70	30	-13
Mutual Funds	53	45	-5
Probability	0.2	0.50	0.30

17. Write a note on concept and advantage of simulation.
18. Write a note on dualing in LPP.
19. Explain with sketch "Decision Tree Analysis"
20. Explain with example "Dominance Rule"
21. Find the saddle point for below game between player A and B using any method using dominance rule.

Player	'B'				
'A'		B1	B2	B3	B4
	A1	1	7	3	6
	A2	5	6	4	5
	A3	7	2	0	3

22. Write a note on Transportation Problem
23. Write a note on steps involved in decision making
24. Write a note on Waiting Line Theory.
25. Apply the queuing system by describing their various system properties.
    - Hospital Emergency Room
    - Traffic Light
    - College Library System
26. Explain steps involved in solving the "Assignment Problem"
27. Write a note on 'Pure and Mixed Strategy".

Civil Engineering

Third Year Part II (Semester VI)

Subject: Principles of Management and Quantitative Techniques. B Tech III Sem VI (w.e.f.Nov.2020)

SECTION II

1. Write a short note on "Material and Material Management".
2. What are the costs associated with inventories? Write the expression for calculating each of them separately.
3. Write a note on ABC Analysis with neat sketch.
4. Write a note on Economic Order Quantity with neat sketch with all formula.
5. Write a note on "R Principles" for purchasing of materials.
6. Write a note on "Standard Inventory Model" for materials management.
7. What are different types of inventories? Explain.
8. Explain with sketch the fixed order quantity system.
9. What is reorder point? Draw a rough sketch of a simple inventory model showing the reorder point, order quantity, maximum stock, safety stock and procurement time.s
10. A company uses a special product in the manufacture of products which it orders from suppliers. The appropriate data are.

    Demand=2000 per annum

    Ordering cost=Rs. 20 per order

    Carrying cost =20% of item price

    Basic item price Rs. 10 per bracket

    Calculate EOQ and discuss why to calculate EOQ?
11. Perform ABC Analysis on the following sample of items. Graph can be drawn on paper with scale if Graph paper is not available.

Items	1	2	3	4	5	6	7	8	9	10
Annual Consumption	300	500	900	1500	100	2000	800	200	3000	700
Price/Units (Rs.)	5	2	4	8	3	2	10	12	2	8

12. Calculate the total cost of inventory and economic order quantity from the following data.

    Annual Consumption = 36000 units.

    Inventory carrying cost = 20% per annum.

    Ordering cost = Rs. 25/-

    Cost per item = Rs. 100/-
13. Explain in details "Break Even Analysis" with the neat graph and formula.
14. Elaborate how the "ERP" is useful for Construction sector.
15. What is "ERP"? Explain its application and benefits for construction sector.
16. Write the following Terms and its formula if.
    a. Statistical Quality Control Charts
    b. Attribute
    c. Variable

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d. X, R, p, c charts formula of Upper Control Line, Central Line and Lower Control Line.

17. Write a note on "Statistical Quality Control".
18. Write a note on P Chart and C chart with graph presentation.
19. Write a note on X Chart and R Chart with graph presentation.
20. Write a note on "Variable Chart of Statistical Quality Control".
21. Write a note on "Attribute Chart of Statistical Quality Control".
22. Draw the 'C' chart for 10 castings were inspection in order to locate number of defects in them. The number of defectives is as shown is tables. Find SQC limits.

No defects	bf	2	3	4	5	6	7	8	9	10	
Casting	2	4	1	5	5	6	3	4	0	7	∑=37

23. Construct the 'P' chart for 10 number of lots from each lot 300 pieces were inspected. The respective defective are 25, 30, 35,40, 45, 35, 40, 30, 20 and 50. Find SQC limits.
24. Construct X Chart from the following data and state whether process is in control or no. $A_2 = 0.73$.

Sample Number	**Bottle Vol. in liter**			
	A	B	C	D
1	15.85	16.02	15.83	15.93
2	16.12	16	15.85	16.01
3	16	15.91	15.94	15.83
4	16.20	15.85	15.74	15.93
5	15.74	15.86	16.21	16.10

25. Construct R Chart from the following data and state whether process is in control or no. $D_2 = 0$ and $D_4 = 2.28$.

Sample Number	**Bottle Vol. in liter**			
	A	B	C	D
1	15.85	16.02	15.83	15.93
2	16.12	16	15.85	16.01
3	16	15.91	15.94	15.83
4	16.20	15.85	15.74	15.93
5	15.74	15.86	16.21	16.10

Question Bank

B. Tech-III Sem-VI New CBCS

Self Learning: Earthquake Resistant Non Engineered Construction

1. State the reasons for the poor performances of masonry buildings in seismic areas.
2. Strong bricks and weak mortar are recommended for masonry buildings. Why?
3. Discuss the behaviour of the unreinforced masonry walls in seismic regions.
4. Discuss the behaviour of the reinforced masonry walls in seismic regions.
5. Discuss the behaviour of the infill masonry walls in seismic regions.
6. Describe the various earthquake resistant features that can be introduced in masonry building to make it earthquake resistant.
7. Write short notes on Categories of masonry buildings
8. Write short notes on Strengthening of masonry walls
9. Write short notes on Types of masonry walls
10. Write short notes on Box-action of walls
11. What are the various methods of restoring an earthquake damaged masonry building?
12. How can an old wall be strengthened by Inserting a new wall?
13. How can an old wall be strengthened by Prestressing?
14. Define bands. At what levels in masonry building would you provide them? Give justification for each of them.
15. How can the rocking of masonry piers in a masonry wall be prevented?
16. What special precautions should be exercised during planning and construction of openings in a masonry wall?
17. Why is timber supposed to be one of the best materials for construction of earthquake resistant buildings? What are its limitations?
18. With regards to the inadequate performance of timber buildings in earthquake prone areas, discuss the Structural connections
19. Discuss the Post-earthquake fires with regards to the inadequate performance of timber buildings in earthquake prone areas
20. With regards to the inadequate performance of timber buildings in earthquake prone areas, discuss the Roofs
21. With regards to the inadequate performance of timber buildings in earthquake prone areas, discuss the Site response
22. Describe the briefly Timber shear wall construction
23. Describe the briefly Stud wall construction

24. Describe the construction procedure and precautions to be exercised for brick-nogged timber framed construction. Draw neat diagrams to support your answer.

25. Write notes on Timber shear walls

26. Write notes on Lessons learned from failures of timber building

27. Which structural element of timber structures is most affected by earthquake? Explain methods to restore and strengthen it.

28. Sketch the internal structure of Earth with explanation

29. Write note on seismic waves generated after earthquake

30. Describe the quantitative measurement-different magnitude scales to measure an earthquake.

31. Which are the planning aspects incorporated for Earthquake resistant design

32. What is meant by Strengthening? Explain few Strengthening features for walls.

33. Explain the significance of RC bands in masonry construction.

34. Elaborate the effects generated after an Earthquake.

35. What causes the Earthquake?

36. What are the quantitative and qualitative measurements of an earthquake? Explain in detail.

37. What are causes of damages due to earthquake in the Brick masonry construction?

38. Explain the soil liquefaction as an effect of earthquake.

39. Write a detailed note on “strengthening of walls” with suitable sketches.

40. Landslide is cause as well as effect of an earthquake. Justify the statement.

B.Tech. (Information Technology)

Class : Third Year **Subject: Elective-I: Data Science**

- **Short answer Questions**
  1. Find rank of given matrix.
  2. Find Determinant of matrix.
  3. Find Inverse of matrix.
  4. Find the probability for given data.
  5. Find the standard deviation for given data.
  6. Categorize given variables into various types.
  7. Explain Simpson's Paradox and Central Limit Theorem.
  8. Explain correlation, causation.
  9. Give the examples of independent, dependent and exclusive events.
  10. What is random variable and its sample space.
  11. Explain Bay's Theorem.
  12. Calculate conditional probability.
  13. Find Frequency table for given column, two-way table for the two columns with and without normalization after dropping null values.
  14. Consider above data table and output for the following
      a. Find Number of records and attributes
      b. Find Unique values for every attribute
      c. Find histogram using any attribute(s).
  15. Find Joint probability and Marginal Probability for given data
  16. What is web scrapping? Explain types of web scrappers.
  17. What is Bigdata. Explain properties of bigdata.
  18. Explain various terms w.r.t Support Vector Machine.
  19. Explain types of machine learning.
  20. Give examples of machine learning for various types.
  21. Explain working of decision tree algorithm.
  22. What is regression? Explain various types of regression.
  23. What is classification? Explain algorithm used for classification.
  24. Explain working of naïve bayes algorithm.
  25. Explain Neural network.
  26. Explain terms training data, testing data, overfitting, underfitting.
  27. Explain working of KNN algorithm.
  28. Explain Supervised learning and its various algorithms.
  29. Explain Unsupervised learning and its types.
  30. Explain Reinforcement learning and its types.
  31. Give measures of classification.
  32. Explain logistic regression.
  33. Explain Terms AI, Machine Learning and deep learning.

34. Explain working of random forest algorithm.
35. Explain terms bias and variance.
36. Explain Ridge Regression and Lasso regression.
37. Explain Regularization.
38. Explain probability mass function, probability distribution function, normal probability distribution
39. Explain central tendencies and dispersion of data
40. Explain True positive, False positive, True Negative, False Negative with example.

- **Long answer Questions**

1 Find mode, mean, median, range and quantile for given data.
2 Find correlation between two variables.
3 Find sample space and probability for given x .
4 Calculate
   a. product of matrix A and vector X
   b. product of Vector X and Vector Y
   c. addition of Vector X and Vector Y
5. Predict class of given instance using KNN algorithm.
6. Predict class of given instance using Naïve Bays algorithm.
7. Which of the attributes would you select as the root in a decision tree with multi-way splits using the entropy measure?
8. For the given confusion matrix, compute accuracy, recall, precision and F2-score.
9. Explain logistic regression and its types.
10. Calculate entropy for given data.
11. What is SVM? Explain types of SVM.
12. Compare types of machine learning.
13. Find probability using Bay's theorem.
14. Find relation and its trend between two variables.
15. How data is visualized using different charts. Give example of each.
16. What is time series data? Explain types of time series data.
17. What is dimensionality reduction? Explain techniques of dimensionality reduction.
18. What is hypothesis testing? Explain steps involved in it.
19. Given data define null hypothesis and alternate hypothesis. State whether null hypothesis accepted or rejected.
20. Explain how multiclass classification is carried out using SVM.

Faculty of Science & Technology -2022
T Y B. Tech [Information Technology] PART-II [CBCS]
Software Engineering
Question Bank

1. Explain Problem Domain and Software Engineering Challenges and Approach?
2. Explain the different phases involved in waterfall life cycle?
3. Illustrate with example purposes of Data Flow diagrams, Entity-Relationship diagrams? Give an example diagram of each.
4. What is Software Process? State and explain the characteristics of Software Process?
5. Draw & explain the Software Development Process Models
   a. Water fall model
   b. Iterative development model
   c. Spiral model
   d. Rational unified Process model
   e. Prototype model
   f. Time Boxing model
   g. Agile process model.
6. What is data modelling? Give 5 examples for data modelling?
7. What is the difference between SRS document and design document? What are the contents should have in the SRS document and design document?
8. Explain the functional and non-functional requirements?
9. What are the Values of Good SRS, explain the process of requirement phase?
10. Extend with example requirements specification, functional specification with Use Cases?
11. Differentiate between Data Flow Diagram, Entity Relationship Diagram.
12. Identify the Role of Software Architecture?
13. Explain with example the architecture views and component & connector?
14. Explain in detail architecture style for component & connector view?
15. Interpret with example documenting architecture design?
16. Explain the Coupling & Cohesion w.r.t. design concepts?
17. Interpret with example the open closed principle?
18. Illustrate with example function-oriented design?
19. Explain with example Object Oriented Design?
20. Write short note on Detailed Design & Verification, Metrics?

21. State and explain different types of testing done during the testing phase?

22. What is the role of testing, why it is essential, explain with example?

23. What is Project management process? Explain with example?

24. Interpret with example the Inspection Process and software configuration management process?
25. Explain with example Effort estimation, Project Schedule and Staffing?
26. What are the concepts behind quality quality planning, justify?
27. State and explain the Factors of Software Quality?
28. Explain the following w.r.t. project management
    a. CMM project management process
    b. Risk Management Planning,
    c. Project Monitoring Plan
    d. Detailed Scheduling
29. State & interpret the advantages of Agile Project Management?
30. Draw and explain the Iterative Project Management Life Cycle?
31. Draw and explain the Adaptive Project Management Life Cycle?
32. Illustrate with example the Management Life Cycle?
33. What are the advantages of Adaptive & Integrating the APM toolkit?
34. What is Scrum? Explain in detail Scrum methodology?
35. Write out the reasons for the Failure of Water Fall Model?
36. What are the fundamental activities of a software process?
37. What are the umbrella activities of a software process?
38. What are the merits of incremental model?
39. What is the difference between the Known Risks & Predictable Risks?
40. Identify in which phase of the software life cycle the following documents are delivered.
    i) Architectural design
    ii) Test plan
    iii) Cost estimate
    iv) Source code document

41. Differentiate between verification & validation?
42. Draw the Context level DFD for the Safe home Software, also define Data dictionary?

43. Why the customer interaction is a difficult process? Explain one formal procedure used for customer interaction?
44. Explain the feasibility studies. What are the outcomes? Does it have either implicit or explicit effects on software requirement collection?
45. Briefly explain the use of global variables in context of coupling cohesion?
46. What are different types of architectural styles exist for software and explain any one software architecture?
47. Explain automated testing tools. How test cases are generated? Discuss when to stop testing? What is performance testing? Describe?
48.

Civil B.Tech. IV Sem VII (w.e.f. June 2021) New CBCS
Design of Concrete Structures II

SECTION –I

1. Design the dog-legged type staircase for a residential building using following data floor to floor height =3.2 m, No. of flight per floor = 2, size of steps =150 mm riser and 250 mm tread, live load is 3 kN/m^2 and assume width of stair is 1.0 m. Use M_{20} concrete and Fe_{415} steel. The stair is supported at top and bottom risers by beam spanning parallel with risers at the landing slab on either side. **8**

2. The dog-legged staircase for building in which the vertical distance between floors is 3.5 m. The live load is taken as 4 kN/m^2 including floor finish. Assume 150 mm riser and 250 mm tread and width of stair is 1.25 m. Use M_{20} concrete and Fe_{415} steel. Stair is supported by beams of width 230 mm at the end of landing slab. **8**

3. Design an open well type stair for a college building using the following data; Floor to floor height is = 3.5 m, No. of flights per floor = 3, Size of steps = 150 mm riser and 300 mm tread, Landing are supported all around by walls and by beams of width 230 mm at floor levels, thickness of wall is 230 mm. Use M_{20} concrete and Fe_{415} steel. **8**

4. Design the dog-legged type staircase for a residential building using following data floor to floor height =3.2 m, No. of flight per floor = 2, size of steps =175 mm riser and 250 mm tread, live load is 3 kN/m^2 and assume width of stair is 1.0 m. Use M_{20} concrete and Fe_{415} steel. The stair is supported at top and bottom risers by beam spanning parallel with risers at the landing slab on either side. **8**

5. Design the dog-legged satircase for building in which the vertical distance between floors is 3.5 m. The live load may be taken as 2.5 kN/m^2. Assume 150 mm riser and 250 mm tread and width of stair is 1.2 m. Use M_{20} concrete and Fe_{415} steel. Stair is supported by beams of width 230 mm at the end of landing slab. **8**

6. Design the stem slab of a counter fort retaining wall , if the height of wall above the ground level is 6.5 m. SBC of soil is 200 kN/m^2 , angle of internal friction is 30º and unit weight of back fill soil 18 kN/m^2. Keep spacing of counter fort as 3.25 m. Coefficient of friction between soil and concrete is 0.5. Use M_{25} concrete and Fe_{500} steel. **10**

7. Design a isolated footing for a R.C. column carrying a vertical load of 1050 kN, and having a size of 550 mm X 450 mm. The safe bearing capacity of is 250 kN/m^2. Use M_{20} concrete and Fe_{500} steel. **10**

8. Design a rectangular tank having capacity of 50000 liters. The depth of water is 2.8 m and the width of tank is 4.2 m. The water tank is rest on firm ground, individual wall panel is free at top, bottom hinged and vertical edges are fixed. Use M_{25} concrete and Fe_{415}steel. Assume free board of 300 mm. Solve by IS code method. **10**

9. Design the stem slab of a cantilever retaining wall, if the overall height of wall is 5.5m. SBC of soil is 200 kN/m^2, angle of repose of the soil is 30º and unit weight of soil 18 kN/m^2, super imposed load due to traffic is 12 kN/m^2, width of the slab base is 3.2 m, toe projection is 0.6 m. Use M_{25} concrete and F_{e500} steel. **10**

10. Design a circular water tank having capacity 500000 liters, resting on firm ground is free at top and bottom is fixed. Depth of water 3 m, Assume free board of 300 mm and solve by IS code method. Use M_{25} concrete and Fe_{500} steel. **10**

11. Design a rectangular footing for column axially loaded of size 230 mm X 550 mm carrying 1100 kN load. The SBC of soil is 180 kN/m^2. Use M_{20} concrete and Fe $_{415}$ steel. Sketch the details of reinforcement. **10**

12. Design a square water tank having capacity 55000 liters, resting on firm ground is free at top , bottom as well as vertical edges are fixed, with following details : depth of water 3 m, Assume free board of 300 mm and solve by IS code method. Use M_{25} concrete and Fe_{500} steel. **10**

13. Design the stem slab of a cantilever retaining wall to retain an earth embankment with a horizontal top 3.5 m above ground level. SBC of soil is 200 kN/m^2, angle of friction ϕ =30º and density of earth 18 kN/m^3, coefficient of friction between concrete and ground 0.5. Use M_{25} concrete and F_{e500} steel. **10**

14. A square column 450 mm X 450 mm carries an axial load of 1400 kN. Design square footing to support the column. The SBC of soil is 200 kN/m^2. Use M_{20} concrete and Fe_{415} steel. **10**

15. Design the stem slab of a cantilever retaining wall, if the overall height of wall is 5.5 m. SBC of soil is 180 kN/m^2, angle of repose of the soil is 30º and unit weight of soil 18 kN/m^2, super imposed load due to traffic is 15 kN/m^2, width of the slab base is 3.2 m, toe projection is 0.6 m. Use M_{25} concrete and F_{e500} steel. **10**

16. Design a rectangular footing for column axially loaded of size 230 mm X 550 mm carrying 1150 kN load. The SBC of soil is 200 kN/m^2. Use M_{20} concrete and Fe $_{415}$ steel. Sketch the details of reinforcement. **10**

17. Design a water tank having capacity 50000 liters, resting on firm ground is free at top , bottom as well as vertical edges are fixed, with following details : depth of water 3 m, Assume free board of 300 mm and solve by IS code method. Use M_{25} concrete and Fe_{500} steel. **10**

18. Design the stem slab of a cantilever retaining wall to retain an earth embankment with a horizontal top 3.6 m above ground level. SBC of soil is 210 kN/m^2, angle of friction ϕ

=30º and density of earth 18 kN/m^3, coefficient of friction between concrete and ground 0.5. Use M_{25} concrete and F_{e500} steel. **10**

19. A square column 450 mm X 450 mm carries an axial load of 1420 kN. Design square footing to support the column. The SBC of soil is 200 kN/m^2. Use M_{20} concrete and Fe_{415} steel. **10**

20. Design a square water tank having capacity 52000 liters, resting on firm ground is free at top, bottom as well as vertical edges are fixed, the depth of water is 3.2 m, Assume free board of 300 mm and solve by IS code method. Use M_{25} concrete and Fe_{500} steel. **10**

SECTION-II

21. A prestressed concrete beam 400 mm x 600 mm in section has a span 10 m and is subjected to a uniformly distributed load of 7 kN/m including the self wt. of the beam . The external load on the beam consist of a concentrated load of 180 kN at mid span. The prestressing tendons are located at 160 mm form bottom of the section. Calculate the extreme streses in concrete for the mid span. The effective prestressing force is 1250 kN. Solve by following methods: stress concept method, strain concept method, load balancing concept. **8**

22. A prestressed concrete beam 400 mm x 600 mm in section has a span 6.2 m and is subjected to a uniformly distributed load of 6 kN/m and a concentrated load of 170 kN at mid span. The prestressing tendons are located at 150 mm from bottom of the section. If prestressing force is 1250 kN, calculate the extreme stresses in concrete for the mid span section. Solve by following methods: stress concept method, strain concept method, load balancing concept. **8**

23. A prestressed concrete beam 400 mm x 600 mm in section has a span 6 m and is subjected to a uniformly distributed load of 6 kN/m and a concentrated load of 180 kN at mid span. The prestressing tendons are located at an eccentricity zero at both ends and 160 mm at centre. If prestressing force is 1200 kN, calculate the extreme stresses in concrete for the mid span section. Solve by following methods: stress concept method, strain concept method, load balancing concept. **8**

24. A prestressed concrete beam 250 mm x 750 mm is prestressed by a parabolic cable located at an eccentricity of 125mm at mid span and zero at the supports. If the beam has a span of 10 m and carries a uniformly distributed load of 6 kN/m, find the effective

prestressing force necessary in the cable for zero shear stress in the beam. For this condition find the stress at mid span section. Concrete weighs at 25 kN/m². **8**

25. A prestressed concrete beam 550 mm x 750 mm in section has a span 12 m and is subjected to a uniformly distributed load of 20 kN/m including the self weight of the beam. The prestressing tendons are located at an eccentricity of 125 mm at mid span and zero at support. Determine the extreme stresses in concrete at the mid span section if the prestressing force 1500 kN. Solve by following methods: stress concept method, strain concept method, load balancing concept. **8**

26. A pretensioned concrete beam 300 mm x 450 mm in section and is provided with 40 wires of 3 mm diameter distributed uniformly over the section. Initially the wires are tensioned in the prestressing beds with a total pull of 700 kN. Determine the final stress in concrete and the percentage loss of stress in wires. Take $E_s = 2.08 \times 10^5$ N/mm², $E_c = 3.20 \times 10^4$ N/mm², Ultimate creep strain $= 32 \times 10^{-6}$ mm/mm per N/mm² Shrinkage of concrete $= 200 \times 10^{-6}$ Relaxation of steel stress = 4.5% of the initial stress. **10**

27. Design PSC I section beam for the following date

- **a)** span=18 m,
- **b)** superimposed load = 35 kN/m,
- **c)** cube strength of concrete at 28 days is 35 kN/m^2,
- **d)** safe stress in concrete at transfer= 0.5 fck,
- **e)** allowable tensile stress in concrete is 0.129√(fck),
- **f)** safe stress in steel in steel is 40% of ultimate stress,
- **g)** total loss of stress 18%,
- **h)** ultimate stress in steel 1350 MPa.
- **i)** safe stress in concrete at service = 0.4 fck **10**

28. A PSC beam 250 mm X 600 mm is subjected to an effective prestressing force of 1300 kN along the longitudinal centroidal axis. Design the end block by Guyon's method. **10**

29. A post tensioned concrete beam 250 mm x 400 mm has a span of 12m. The beam is prestressed by steel wires of area 350mm² provided at a uniform eccentricity of 60 mm with an initial prestress of 1150 N/mm². Determine the percentage loss of stress in the wires. Take $E_s = 210$ kN/mm², $E_c = 35$ kN/mm², Ultimate creep strain $= 22 \times 10^{-6}$ mm/mm per N/mm², Shrinkage of concrete $= 215 \times 10^{-6}$, Relaxation of steel stress = 5% of the initial stress. Anchorage Slip = 1.25mm, Friction coefficient for wave effect K = 0.00015m. **10**

30. Design PSC I section beam for the following span=18m, superimposed load of 38 kN/m, cube strength of concrete at 28 days is 35kN/m^2, safe stress in concrete at transfer= 0.5 fck, allowable tensile stress in concrete is 0.129 √(fck), safe stress in steel is 60 % of ultimate stress, total loss of stress 18%, ultimate stress in steel 1400 MPa. **10**

31. A prestressed concrete beam 400 mm wide and 800 mm deep. Determine the horizontal, vertical and shear stresses at the point Q(600,600), as bottom of the end block is origin. Fond also the principal stresses at Q. the tendons are placed at an eccentricity of 100 mm. The anchor plate is 300 mm wide and 200 mm deep. The prestressing force is 1050 kN. **10**

Kz	Kq
-2.47	0.251

32. a) A rectangular prestressed concrete beam has span of 12 m and has to carry a live load of 15kN/m excluding the self weight of beam. Given fc= 16 N/ mm^2 and fs=1050 N/ mm^2. Design the beam using 6 mm tendons. Weight of concrete is 24 kN/m^3. **7**

b) write design steps for I section PSC beam. **3**

33. A prestressed concrete beam 250 wide and 650 mm deep is subjected to an effective prestressing force of 1300 kN along the longitudinal centroidal axis. The cable may be assumed to be symmetrically placed over mild steel anchor plate in an area 150 mm X 350 mm. Design the end block by IS code method. **10**

34. A pretensioned beam 250 mm widw and 360 mm deep is prestressed by 10 wires of 8 mm diameter initially stressed to 1000 $N/mm^{2.}$ The centroid of the steel wires is located at 105 mm from the soffit. Determine the maximum stress in the concrete immediately after transfer allowing elastic shortning of concrete only at the level of the centrois of steel. If, however, the concrete is subjected to additional shortening due to creep and shrinkage and the steel is subjected to a relaxation of stress of 5 percent find the final percentage loss of stress in the steel wires.Take E_s = 210 kN/mm^2, E_c= 36.85 k N/mm^2, creep coefficient ϕ=1.60. total residual shrinkage strain= 3 x 10^{-4}. **10**

35. A rectangular prestressed concrete beam has span of 12 m and has to carry a live load of 15 kN/m excluding the self weight of beam. Given fc= 15 N/ mm^2 and fs=1020 N/ mm^2. Design the beam using 6 mm tendons. Weight of concrete is 24 kN/m^3. **10**

36. A prestressed concrete beam 250 wide and 650 mm deep is subjected to an effective prestressing force of 1355 kN along the longitudinal centroidal axis. The cable may be assumed to be symmetrically placed over mild steel anchor plate in an area 150 mm X 350 mm. Design the end block by IS code method. **10**

37. A pretensioned beam 250 mm wide and 360 mm deep is prestressed by 10 wires of 8 mm

diameter initially stressed to 1020 N/mm2. The centroid of the steel wires is located at 100 mm from the soffit. Determine the maximum stress in the concrete immediately after transfer allowing elastic shortening of concrete only at the level of the centroid of steel. If, however, the concrete is subjected to additional shortening due to creep and shrinkage and the steel is subjected to a relaxation of stress of 5 percent find the final percentage loss of stress in the steel wires. Take Es = 210 kN/mm2, Ec= 36.85 k N/mm2, creep coefficient ϕ=1.60. total residual shrinkage strain= 3 x 10^{-4}. **10**

38. Design a PSC I section to the following data :Span =16m, superimposed load load 30 kN/m, concrete used M30 , total loss of prestress 20% ,ultimate stress in steel 1500 N/ mm2, safe stress in concrete at transfer of prestress = 0.5 fck , safe stress in concrete in compression at service = 0.4 fck, allowable tensile stress in concrete = 0. 129 $\sqrt{fck}$., safe stress in steel =60% of ultimate stress. **10**

39. post tensioned concrete beam 250 mm x 400 mm has a span of 12m. The beam is prestressed by steel wires of area 350 mm² provided at a uniform eccentricity of 50 mm with an initial prestress of 1200 N/mm². Determine the percentage loss of stress in the wires. Take E_s = 210 kN/mm², E_c= 35 kN/mm²,Ultimate creep strain = 22 x 10^{-6} mm/mm per N/mm², Shrinkage of concrete = 215 x 10^{-6}, Relaxation of steel stress = 5% of the initial stress. Anchorage Slip = 1.25mm, Friction coefficient for wave effect K = 0.00015m. **10**

40. A prestressed concrete beam 250 wide and 650 mm deep is subjected to an effective prestressing force of 1300 kN along the longitudinal centroidal axis. The cable may be assumed to be symmetrically placed over mild steel anchor plate in an area 150 mm X 350 mm. Design the end block by IS code method. **10**

QUESTION BANK

Composite Materials

1. Define composite material.

2. What is the need for composite material?

3. Mention important characterits of composite material

4. Give examples for fiber material

5. Mention important matrix materials

6. Define lamina

7. Write the generalized Hooks Law for composite materials

8. What are composite materials?

9. Classify composite material.

10. What is the role of matrix is a composite material?

11. What is the role reinforcement in composite materials?

12. What are the advantages of composite materials?

13. Give examples use of composite materials.

14. List types of fibres used in FRP.

15. What are various types of Matrices used in FRP?

16. Give characteristics of reinforcement material

17. List the characteristics of matrix material.

18. What are laminae?

19. What is laminate and how it is classified?

20. List components of stress-strain in a 3-D continuum.

21. What is plane stress condition?

22. Write the compliance matrix for plane stress.

23. Write stiffness matrix for plane stress.

24. What is the relevance of plane stress condition, which is the behaviour of laminae?

25. What is a cross-ply laminate?

26. What is an angle-ply laminate?

27. Write transformation matrix for an angle-ply matrix.

28. How engineer properties of a laminate are predicted from micromechanics?

29. Write the laminate stress-strain relation in material coordinate.

30. Write the laminate stress-strain relation in laminate global coordinate system.

31. What are the laminate stress relations?

32. Write laminate strain resultants?

33. Explain the Symmetric laminate

34. Explain the unsymmetric laminate

35. Describe various manufacturing techniques.

36. Write stability laminations of various manufacturing techniques.

37. Write the various engineering applications of composites.

Questions Bank

Class: Final BTech(E&TC)-Sem-I **Subject: Internet of Things**

Q. 1. Attempt any four questions. (4x4=16 Marks)

1. Define IoT. What are different components of an IoT system?
2. What is IOT? Give example of IoT used in streetlight.
3. What are different components of an IoT system? Explain in details
4. Explain different sensors used in IOT.
5. Explain cloud used in IOT.
6. What are different applications of IoT in various domains?
7. What are the functions of various functional units in a microcontroller that embedded in an IOT device?
8. Explain basics of microcontroller based embedded systems.
9. Explain basics of Linux based embedded systems.
10. Explain the various embedded platforms used in in IoT,
11. Write different Features of ARM Cortex M3 Processor.
12. Explain cortex series classification (A, R, M series).
13. Write short note on ARM Cortex M3 memory map.
14. List down and discuss the flags available in ARM Processors.
15. Write short note on ARM Cortex-M3 processor registers.
16. Write different Features of Raspberry Pi.

Q. 2. Attempt any two questions. (6x2=12 Marks)

1. Give example of IoT's used in a smart home with sensors, actuators and smart home automation software.
2. With neat diagram illustrate architecture framework developed by CISCO for city.
3. Draw and explain the architectural view of cloud based IoT platform for smart home.
4. With a neat diagram illustrate the IoT reference architecture suggested by Oracle.
5. What are the various IDEs used for embedded development.
6. Draw and explain block diagram of ARM Cortex-M3 processor.
7. Interface LED with LPC1768.Write an embedded C program to blink LED continuously.
8. Interface switch and LED with LPC1768.Write an embedded C program to turn LED when switch is pressed.
9. Write short note on:
   a) Operation modes
   b) Cortex-M3 processor registers
   c) Nested Vectored Interrupt Controller (NVIC)
   d) Memory Map

Q. 3. Attempt any four questions. (4x4=16 Marks)

1. With neat state diagram discuss classic Bluetooth connection process.
2. Explain the concept of WiFi.
3. Write applications of Bluetooth low energy technology.
4. Write in details the concept of APIs.
5. Elaborate with neat diagram Zigbee packet format and addressing.
6. Write a short note on RFID Controllers and RFID frequency bands.
7. Write short note on RFID tags and RFID controllers.

8. Write note on their architecture, characteristics and limitation of Bluetooth.
9. Write note on their architecture, characteristics and limitation of Zigbee.
10. Write note on their architecture, characteristics and limitation of Wifi.
11. Write note on their architecture, characteristics and limitation of RFID.
12. Explain IPv4 frame format in details.
13. Explain IPv6 frame format in details.
14. With an example discuss the CoAP NON and CON messaging in detail.
15. With neat diagram discuss public, private and hybrid cloud models.
16. Explain the costing structure of a cloud for IoT with an example.

Q. 4. Attempt any two questions. (6x2=12 Marks)

1. Discuss with neat diagram the MQTT publish-subscribe model and topology.
2. Illustrate following MQTT communication formats in details.
   a) CONNECT –Client to Server
   b) CONNECT – Server to Client
   c) PUBLISH
   d) SUBSCRIBE
3. Explain IOT Cloud Architecture.
4. List down different messages used in CoAP and elaborate with neat diagram a CoAP message format
5. Discuss 6LoWPAN communication Protocols in details.
6. What is a Cloud? Discuss different services supported in Cloud
7. Discuss with neat diagram the MQTT publish-subscribe model and topology.
8. List down and discuss levels of quality of service in MQTT.
9. What is MQTT protocol? List down the requirements provided by MQTT protocol.

QUESTION BANK

Fourth Year B. Tech(E&TC) Sem I (w.e.f. June 2021)

Elective II: Image & Video Processing

Short questions of 4 marks each:

SECTION I

Unit No.1

1) What are 4 neighbors, 8 neighbors & m neighbors of pixels in an image?
2) What is HSI color model and how it can be obtained using RGB color model?
3) What is image acquisition? Which factors affect the quality of an image?
4) What is 2D sampling of an image? What is sampling theorem?
5) What is CMY color model of an image? What are its applications?

Unit No.2

6) What is histogram equalization and how it is done?
7) What is Thresholding and how it is used for image enhancement?
8) What is filter mask in spatial domain? What are different low pass filters? Compare their performance.
9) What is high boost filtering in spatial domain? Elaborate with example.
10) How image sharpening is implemented in frequency domain?
11) What is bit plane slicing and how it is implemented?
12) What are image sharpening techniques in frequency domain? Which is best technique and why?
13) What is Power law transformation? What is gamma correction?
14) What are Order statistics Filters?
15) What are Butterworth filters used for smoothening of an image?

Unit No. 3

16) How isolated points are detected using Laplacian mask from given image?
17) What are line detection masks used in image segmentation?
18) What is Dilation operation in image morphology?
19) What is opening operation in image morphology?
20) How global thresholding is used for detecting edge from an image?
21) What is region based segmentation?
22) What is Erosion operation in image morphology?
23) What is closing operation in image morphology?
24) What is thresholding used in image segmentation?
25) What is thinning operation in image morphology?

SECTION II

Unit No. 4

1) What is image degradation/restoration model?
2) What are different types of noise? Draw probability density functions of these noise.
3) What are Mean filters used in restoration process?
4) What are adaptive filters?
5) What are Notch filters?

Unit No. 5

6) What are I, P & B frames in digital video?
7) What are digital video formats?
8) Explain the principle of color video camera.
9) What is sampling in two dimensions and three dimensions?
10) Explain progressive scanning in video signals.
11) What are quality measures of Digital video?
12) Why digital video signal does not require synchronizing pulses?
13) What is interlaced scanning and in which application it is used?
14) Compare progressive and interlaced scanning.
15) What is sampling theorem? What are sampling rates used for digital video?

Unit No. 6

16) What is motion estimation criteria?
17) What are optimization methods for two dimensional motion estimation?
18) What are optical flow equations for two dimensional motion?
19) What is phase correlation method in two dimensional motion estimation?
20) What is Pixel based motion estimation?
21) What is Exhaustive block matching?
22) How motion estimation is done using Hierarchical block matching
23) Which technique of motion estimation is better and why?
24) What is Binary feature matching?
25) What are limitations of phase Correlation method of motion estimation?

Long questions of 6 marks each:

SECTION I

Unit No. 2

1) What is homomorphic filtering in image processing? Elaborate it with algorithm & mathematical equations. What are its applications?
2) What is histogram stretching and histogram equalization? Compare their performance.
3) Why histogram equalization is better than histogram stretching?
   Equalize the given histogram of an image.

Gray Levels	0	1	2	3	4	5	6	7
No. of pixels	740	1073	855	656	329	240	122	81

4) What is histogram specification? Perform histogram specification for following.

   Original image histogram:

Gray Levels	0	1	2	3	4	5	6	7
No. of pixels	8	10	10	2	12	16	4	2

   Desired image histogram:

Gray Levels	0	1	2	3	4	5	6	7
No. of pixels	0	0	0	0	20	20	16	8

5) What are basic intensity transformation functions?
6) What are High pass filters in spatial domain?
7) How image sharpening is done using frequency domain filters?
8) What is High boost filtering? What are its applications?
9) What are averaging filters? Which is best filter and why?
10) What are Band reject filters? State its applications?

Unit No. 3

11) What are Roberts, Prewitt and Sobel mask used for edge detection? How edges are detected using these masks?
12) What is hit or miss transform and how it is implemented? What are its applications?
13) What are techniques used for Edge linking in image? How edge linking is done using local processing?
14) What is thinning and thickening of image? How it is implemented in image morphology?
15) What is edge linking operation and how it is done using Hough transform?

SECTION II

Unit No. 4

1) How degradation functions are estimated? Explain in detail.
2) How image restoration is done using Weiner filter?
3) What are different sources of noise responsible for image degradation?
4) What is optimum Notch filtering?
5) What is image restoration using Inverse filters?

Unit No. 5

6) What is digital video sampling?
7) Explain process of capturing digital video in detail.
8) What are digital video standards?
9) What are digital video frame classifications?
10) What is sampling in three dimensions?

Unit No. 6

11) Explain optical flow techniques for two dimensional motion estimation.
12) What are pixel based motion estimation techniques? Explain any one technique,
13) What is multi resolution motion estimation for digital video?
14) What is phase correlation method of motion estimation?
15) Explain Hierarchical block matching algorithms.

PAH Solapur University, Solapur

Class: T.Y. B.Tech - E&TC Sem: I

Subject: Eletromagnetic Field Theory

Question Bank

1) State and prove Gauss' law.
2) State and prove divergence theorem.
3) Derive the expression for point form of Gauss's law.
4) Determine the total charge inside the volume indicated by
   a. $\rho v = 4x\,y\,z^2 \quad if\ 0 \le \rho \le 2, 0 \le \phi \le \frac{\pi}{2}, 0 \le z \le 3$
5) A point charge of 6 nC located at origin in free space. Find V_{PQ} if point P is located at (0.2, -0.4, 0.4) & Q is at (-0.5, 1, -1). Also find V_P if V = 20 V at point Q.
6) Electric dipole located at origin in free space has dipole moment
   a. $\bar{p} = 3\,\overline{ax} - 2\,\overline{ay} + \overline{az}$nC-m. Find V at P(2 , 3 , 4).
7) Find $\bar{E}$ at P(1,5,2) in free space due to
   i)point charge of 6 μC is located at Q(0,0,1),
   ii) uniform line charge of 180 nC/m lies along x axis,
   iii) a sheet charge of 20 nC/m^{2}is placed at y=3,
8) Derive the equation for $\bar{E}$ due to infinite sheet charge placed in z=0 plane.
9) Derive the equation for $\bar{E}$ due to infinite length charge
10) Derive the equation for $\bar{E}$ due to infinite volume charge
11) Derive an expression for curl of a vector.
12) State Stoke's theorem and explain it.
13) Define divergence, gradient, curl in spherical co-ordinate system with mathematical expression.
14) Prove that divergence of a curl of a vector is zero, using Stoke's theorem
15) State and explain Ampere's circuital law.
16) Establish the boundary condition for dielectric boundary having permeability ε_1 and ε_2.
17) In a medium if $\bar{E} = Em\ sin\alpha \cos(wt - \beta z)\,\overline{ay}$ V/m find $\bar{H}$. If magnetic field intensity in a region is $\bar{H} = x^2\overline{ax} + 2yz\,\overline{ay} - x^2\overline{az}$find current density at point P (2,3,4)
18) Derive Maxwell's equations in point and integral form for time varying field.
19) Evaluate both sides of Stroke's theorem for the field $\bar{H} = \left(\frac{y^2z}{x}\right)\overline{ax} + (0.5\frac{y^2z^2}{x^2})\overline{az}$ crossing the square surface in the plane y = 2 bounded by x = z = 1 and x = z = 2.
20) Name few applications of Gauss law in electrostatics.
21) Give the relation between electric field intensity and electric flux density.
22) Give the relationship between potential gradient and electric field.
23) Derive the boundary conditions of the normal and tangential components of electric field at the inter face of two media with different dielectrics.
24) Derive Maxwell's equations in point and integral form for static field.
25) Derive Maxwell's equations in point and integral form for harmonically varying field.
26) Drive an expression for energy stored and energy density in electrostatic field.
27) State and explain Biot Savart's Law.
28) Derive the expressions for magnetic field intensity due to finite and infinite line.
29) Derive the expressions for magnetic flux intensity due to circular loop.
30) Derive an expression for energy stored and energy density in magnetic field.
31) Explain the concept of vector magnetic potential.
32) Derive the expressions for boundary conditions in magnetic fields.
33) What Is significance of displacement current density?

34) What do you mean by displacement current? Write down the expression for the total current density.
35) State Poynting theorem and derive the expression for Poynting theorem.
36) What is the different co-ordinate systems used to represent field vectors? Discuss about them in brief.
37) Using Divergence theorem evaluate $\iint$ A.ds where A = 2xy ax + y2 ay + 4yz az and S is the surface of the cube bounded by x =0 , x = 1; y = 0, y = 1; and z = 0, z = 1.
38) Determine the divergence and curl of the vector A = x ax + y ay+ y az
39) Determine the gradient of the scalar field at P($\sqrt{2}$, л/2, 5) defined in cylindrical co-ordination system as A = 25 r sin Φ.
40) What is dipole? Derive the expression for potential and electric field intensity due to a dipole.
41) State and explain Coulomb's Law.
42) Derive the expression of transmission line using field theory.
43) Derive the expression of transmission line using circuit theory.
44) Explain following parameters:
    i) propagation constant
    ii) reflection coefficient
    iii) characteristics impedance
    iv) transmission coefficient
    v) VSWR
45) State Coulomb's law and write the equation of F that exists between two unlike Charges?
46) Point Charges Q1=4μc ,Q2=-5μc and Q3=2 μc are located at (0,0,1).(-6,8,0) and (0,4,-3) respectively. Find at the Origin.
47) Define Transmission line and explain the Primary Constants.
48) A Transmission line operating at 500 MHz has Z0=80α , Ω =0.04 Np/m, =1.5 rad/m. Find the Line Parameters R, L, G and C.
49) What is Smith Chart? Explain the Construction of the Smith Chart.
50) What is skin depth? Write an expression for skin depth in case of good conductor.
51) What are different mechanisms of propagation of electromagnetic waves? Explain in detail.
52) What is electric flux density? Derive the expression for flux density due to line charge.
53) What is electric potential? Derive the expression for potential due to point charge.
54) Explain the concept of absolute potential with the expression.
55) Derive the wave equation for magnetic field, for lossless media.
56) Derive the wave equation for electric field, for lossless media.
57) What is intrinsic impedance? How you can write the expression for it.
58) Explain smith chart in detail with proper diagram.
59) What is standing wave ratio? How you can measure VSWR by using Smith chart?
60) Derive Helmholtz wave equations for free space.

Name: K.R. Pardeshi

Designation: Assistant Professor

Department: Computer Science & Engg Dept

College: Walchand Institute of Technology, Solapur

Subject: Modern DataBase System

Class Final Year BTech (CSE) Semester-I

Question Bank

Answer in Short (4-5 marks Question)

1. Explain Transaction Server
2. Describe issues in Data Server
3. What are different parallel database architecture?
4. Differentiate between Vertical and Horizontal fragmentation.
5. Compare three partitioning techniques.
6. Elaborate Range Partitioning sort with example
7. State & apply horizontal and vertical fragmentation on given dataset.
8. Write a note on Independent Parallelism
9. Explain InterQuery parallelism
10. Explain Intra-Query parallelism
11. Explain Inter-operator parallelism
12. Describe Independent parallelism
13. Explain Bully algorithm
14. Write a note on data warehouse and its design issues.
15. Compare between OLAP and OLTP.
16. How *Type inheritance* can be used in SQL
17. Describe index nested loop join
18. Write a note on NoSQL.
19. Differentiate SQL, NoSQL and NewSQL.
20. Write features of MongoDB and Postgre SQL.

Answer in brief (7-8 marks question)

1. Explain Two Phase Commit Protocol (2PC) with failure handling.
2. Explain three partitioning techniques in detail.
3. In Distributed database how data is fragmented explain with example.
4. Explain Global wait-for-graph with example
5. Explain CAP Theorem in detail
6. Describe on Fragment and replicate join
7. What parallelism is used by Pipelined parallelism? Elaborate with proper example
8. Explain variants of distributed lock manager approach in concurrency control.
9. Explain in detail KDD process of Data Mining.
10. Explain different data warehouse schema with example.
11. Describe OLAP operations performed on DataWareHouse.
12. Explain Association Rule algorithm with support and confidence.
13. Explain Decision-Tree with example
14. In object oriented databases, how table is created using *Structure Types* Explain with example, also give *method declaration* and *definition.*
15. In a datacube, how the rollup and drill down operations are working? Write the queries with example.
16. How the user generated and system generated references are created in SQL. Elaborate object references with examples.
17. Explain Nested Loop join and Block nested loop join
18. What is array and multiset? How they are applied in SQL.
19. What is Unnesting? Consider the relation **books (title,authors,publisher,keywords)** and write the unnest queries
20. Differentiate Object Oriented DBMS and Object Relational DBMS.
21. Explain Merge-Join with example
22. Explain Partition Parallel Hash Join in detail.
23. Explain External Sort Merge Algorithm with example.
24. What are different steps in query processing.
25. Describe various forms of Equivalence Rules.
26. Explain how query optimizer use Equivalence rule to systematically generate expressions equivalent to given expression
27. Explain the algorithm for selections using linear search and using indices.
28. Explain HADOOP HDFS architecture
29. What is Big Data? Explain V's associated with Big data in detail.
30. Explain how MapReduce work on below given dataset.

Question Bank

Subject: Managerial Economics (Open Elective - I)

CBCS (w.e.f. – June 2021)

Class: T.Y. B.Tech (Electrical) Sem-I

Section I

A. Four Marks Questions:

1. Explain the concept economics and managerial economics.
2. Explain scope of managerial economics for business decision.
3. State the difference between Microeconomics and Macroeconomics.
4. Explain the following terms
   a. i) Microeconomics ii) Macroeconomics
5. State & explain the law of demand and law of supply.
6. Explain the various types of demand in detail.
7. Explain the following terms
   a. i) Demand ii) Market demand iii) Supply iv) Market equilibrium
8. Explain measuring values of market exchange.
9. Explain the concept Price ceilings and Price floors.
10. Explain demand utility and consumer demand analysis.
11. Explain cardinal and ordinal approach of consumer behavior.
12. State the comparison between Cardinal and Ordinal Utility.
13. Explain the concept elasticity of demand in detail.
14. Explain price elasticity of demand.
15. State and explain the Factors Affecting Price Elasticity.
16. Explain the concept cross price elasticity.
17. Explain the concept income elasticity of demand.
18. Explain advertisement or promotional elasticity of sales.
19. Explain elasticity of price expectations.
20. Explain elasticities for nonlinear demand functions.

B. Six Marks Questions:

1. State the difference between Microeconomics and Macroeconomics.
2. Explain the changes of demand and supply on market equilibrium.
3. Explain the impact of price elasticity on total revenue and marginal revenue.
4. Explain economics contribution to managerial decision.
5. State and explain the determinants of demand.
6. Explain elasticity of supply. Also state the factors affecting the elasticity of supply.
7. Explain measuring values of market exchange.
8. State and explain the Factors Affecting Price Elasticity.
9. Explain the following terms
   i) Demand ii) Market demand iii) Supply iv) Market equilibrium
10. Explain demand utility and consumer demand analysis.

Section II

A. Four Marks Questions:

1. Explain graphical method of trend projection demand forecasting.
2. Explain the least square method of trend projection demand forecasting.
3. Explain Barometric Method for demand forecasting.
4. Explain linear Regression method for demand forecasting.
5. Explain multiple regression method for demand forecasting.
6. Explain non-linear Regression method for demand forecasting.
7. Explain Simultaneous equation method for demand forecasting.
8. Explain Linear Programming (LP). Also state the advantages and limitations of LP Techniques.
9. State and explain the applications of Linear Programming Techniques.
10. What is production? Explain the concept of production function.
11. Explain various costs of Production in detail.
12. Explain following costs of Production:
    i) Actual Cost and Opportunity Cost ii) Business and Full Costs
    iii) Explicit and Implicit/Imputed Costs iv) Out-of-Pocket and Book Costs
13. Explain following costs of Production:
    i) Incremental Costs and Sunk Costs ii) Historical and Replacement Costs
    iii) Private and Social Costs
14. Explain breakeven analysis. Also state the limitations of breakeven analysis.
15. Explain the impact of linear cost and revenue functions on breakeven analysis.
16. Explain the concept profit margin of safety.
17. What is market? Explain the various types of market.
18. Explain the concept demand side of market.
19. Explain the concept supply side of market.
20. Explain Market Structure. Also state the objectives of market structure.

B. Six Marks Questions:

1. Describe Survey Methods for demand forecasting.
2. Explain Trend projection method for demand forecasting.
3. Explain the degree of competition in market.
4. Explain Pricing Decision and Monopoly Power in detail.
5. Explain following costs of Production:
   i) Fixed and Variable Costs ii) Total, Average, and Marginal Costs
   iii) Short-Run and Long-Run Costs
6. Explain following costs of Production:
   i) Actual Cost and Opportunity Cost ii) Business and Full Costs
   iii) Explicit and Implicit/Imputed Costs iv) Out-of-Pocket and Book Costs
7. Explain Econometric Methods for demand forecasting.
8. Explain the impact of non-linear cost and revenue functions on breakeven analysis.
9. State and explain the characteristics of market structure.
10. Explain Linear Programming (LP). Also state the advantages and limitations of LP Techniques.

Name: K.R. Pardeshi

Designation: Assistant Professor

Department: Computer Science & Engg Dept

College: Walchand Institute of Technology, Solapur

Subject: Operating System

Class T.Y. BTech (CSE) Semester I

Question Bank

Answer in Short (4-5 marks Question)

1. What is an operating system? What are different roles of OS.
2. Explain multiprogramming OS
3. Time sharing OS
4. Real Time OS
5. What is process? Explain Process State Transition Diagram
6. Explain PCB
7. Explain send() and receive() primitives. What are different design options for implementing each primitive.
8. Give benefits of Cooperating Process
9. Explain different CPU criteria
10. What is convey effect?
11. What is preemptive and non-preemptive scheduling
12. Describe Multiple Processor scheduling
13. What is thread? Differentiate user and kernel thread.
14. Explain different types of thread.
15. Explain benefits of thread.
16. What is critical Section Problem
17. Write a note on semaphore.
18. TestAndSet and Swap instruction
19. Four necessary conditions for deadlock.
20. Explain Wait-for-Graph.
21. What is the mechanism to detect deadlock in single instance resource type algorithm?
22. Explain Hardware address protection with base and limit registers
23. Explain Fragmentation
24. Write a note on Hash page tables

25. Write a note on Inverted Page Tables
26. Differentiate between paging and segmentation
27. What is page Fault? Explain the steps in handling the page fault.
28. Explain the need of page replacement.
29. Describe with help of example, how overlays enable a process to be larger than the amount of memory allocated to it.
30. Explain Additional Reference Bit Page Replacement Algorithm.
31. Explain Second Chance Page replacement algorithm.
32. Paging hardware with TLB. Explain with diagram.
33. Explain Thrashing Concept
34. Explain Polling in detail
35. Describe Character and Block Device

Answer in brief (7-8 marks question)

1. What is Scheduler. Explain different types of Scheduler in detail.
2. How Interprocess Communication takes place using message passing system between cooperating processes.
3. Explain First Come First Serve with example.
4. Explain Shortest Job First with example.
5. Explain Priority with example.
6. Explain Round-Robin with example.
7. Write structure of producer and consumer process for bounded buffer problem using semaphore *mutex*.
8. Write Peterson's Solution for Critical Section Problem.
9. Explain Reader-writer problem
10. Explain Dining Philosopher problem.
11. What is monitor explain solution for dining philosopher problem using monitor.
12. How deadlock can be prevented? Write different deadlock prevention techniques.
13. How RAG is used for detection of deadlock?
14. Explain Bankers algorithm for deadlock avoidance.
15. Solve example based on banker's algorithm
16. Explain how deadlock can be detected in single instance of each resource type.
17. Explain how deadlock can be detected in multiple instance of each resource type.
18. Explain how deadlock can be recovered using process termination and resource preemption
19. Explain paging mechanism in detail.
20. Explain segmentation hardware in detail

21. Apply first fit, best fit, worst fit algorithm for given processes and memory partition
22. Illustrate FIFO, LRU and Optimal page replacement algorithm for given reference string.
23. How segmentation and paging techniques are used in Intel 80386 address translation mechanism
24. Explain DMA transfer steps in detail.
25. Explain Streams in Detail.

T.Y.B.Tech (CSE) (Part-I) Examination-June\July-2022

Subject: System Programming

Question Bank

4marks

1 Explain different types of grammar with example.
2. Explain in detail front end & back end of toy compiler with the help of examples.
3. Explain language processor development tool.
4. Explain in detail fundamental language processing activities.
5. What is LPDT? Explain YACC in detail.
6. Differentiate translator & interpreter.
7. Explain different types of grammar with their characteristics & limitations.
8. What is LPDT? Explain LEX in detail.
9. How does LEX works? Give illustration.
10. What is System Programming? How is it different from application programming?
11. Discuss two variants of intermediate code in assemblers.
12. Explain assembler directives START, END, ORIGIN, EQU, and LTORG with example for each.
13. Explain Pass-I of Two-Pass assembler along with data structure used.
14. Explain different types of assembly language statement.
15. List and explain advanced assembler directives with examples.
16. Write & explain algorithms used for two pass assembler in detail.
17 Explain symbol table, FRT and CRT of Single pass assembler in detail.
18 List & illustrate phases of assembler.
19. Explain forward reference problem in assembler.
20. Explain the analysis of an assembler.
21. Differentiate assembler, compiler and interpreter.
22 State the reasons for the assembler to be multipass program.

23. Explain macro with macro-processor expansion of macro?
24. Describe the features offered by Macro facility. Give example.
25. What is Macro? How it is different from subroutine?
26. Write short note on: Nested Macro call.
27. Write short note on: Macro processor
28. What is lexical & semantic expansion? Explain with example, how macro & subroutine differ?
29. Discuss different kind of parameter in macros.
30. List all tasks involved in macro expansion.
31. Define macro & macro expansion. What is lexical & semantic expansion?
32. Explain advanced macro facilities with example.
33 Explain control & data flow analysis for optimizing transformation.
34. Explain frequency reduction & strength reduction with examples.
35. Explain data flow analysis in global optimization.
36. Discuss major issues in code generation for expression.
37. Describe triples, quadruples and indirect triples? Explain.
38. Explain operand & register descriptor with example.
39. Explain different optimizing transformation used in compilers.
40. Explain triple, quadruples & expression trees in intermediate code expression.
41. List major issues in code generation for expression. Explain operand & register descriptor with examples.
42. Define program flow graph. Explain control flow analysis in global optimization.
43. Explain program relocation & linking.
44. Explain design of linker in detail.
45. Explain program relocation & linking concept.
46. Write algorithm for program linking with example.
47. What steps are followed in linker design?
48. Discuss linking for overlays in detail.
49. Discuss about ‘self-relocating programs’.
50. Explain linking of overlays with example.
51. Explain Linking concept with example.
52. Explain Loader and its functions and different types of loaders.
53. Explain with example general loader scheme.
54. What is relocating loader? Explain who performs the four functions of this

loader.
55. Explain the terms BSS, overlay and binding with respect to loaders.
56. Write short note on loaders.
57. Explain dynamic loading in detail.
58. Write a short note on: Design of direct linking loader, Dynamic linking.
59. Explain absolute loader in detail.
60. Describe direct linking loader.

6 marks

1. What are the tools used for language processing? Give examples.
2. Define FR, LP pass and IR. What are desirable properties of IR?
3. What is binding & binding time. Discuss different binding times with example.
4. Prepare an IR by making front end analysis of following program
P: integer;
Q, R: real;
Q: = R + P;
5. Explain scanning & parsing in detail.
6. Explain the concept of derivation & reduction with example.
7. Explain the concept of derivation, reduction and parse with example.
8. Explain program interpretation and program execution.
9. What is relocation? When is linking address & loading address equal?
10. Explain problem oriented and procedure oriented languages.
11. Discuss the pass structure of assemblers. How is the problem of forward reference resolved in single pass & two pass translations?
12. Explain the concept of linking. What are binary programs & object modules used in linking.
13. Discuss different intermediate code forms. Compare them based on memory requirement.
14. Explain assembler? Why assembler required two passes? Is it advantages or disadvantages over one parse assembler?
15. What tables are generated after Pass-I of two pass assembler?
16. What data structure is used top design single pass assembler?
17. Explain the tables generated by two pass assembler.
18. Explain different phases of a two pass assembler.

19. Write the algorithm for processing of macro definition and explain with the help of example.
20. Write the algorithm for macro expansion and explain with the help of example.
21. Explain the following facilities for expansion time loops: REPT and IRP
22. Discuss macro definition, call and expansion in detail with examples.
24. What is absolute loader? How it differs from relocating loader .
24. Compare between local & global optimization technique for code.
25. Give the aspects of compilation. Explain data types & scope rules, the PL features used to implement the aspects of compilation.
26. Describe the working of a direct linking loader. Explain in detail the various data structure used.
27. Describe the working of direct linking loader. Explain in details various data structure used.
28. Explain program relocation & linking algorithm with example
29.Explain the PL features used in implementation of aspects of compilation.
30. What are functions performed by loaders.
31. What is meant by Linking? Explain binary programs and object modules used in linking?

Question Bank

Subject: Switchgear & Protection

CBCS (w.e.f. – June 2021)

Class: Final Year B.Tech (Electrical) Sem-I

A. Four Mark Questions

1. What are desirable qualities of protective scheme?
2. What do you mean by zones of protection? Explain primary and backup protection.
3. What are the advantages of static relay over electromagnetic relay?
4. Explain static overcurrent relay with neat diagram.
5. Explain construction and operation of directional overcurrent relay.
6. Explain microprocessor based relay with block diagram.
7. What different types of fuse? Explain construction and operation of HRC fuse with neat diagram.
8. What are the factors affecting for selection of fuse?
9. Explain the following terms
10. Fuse element b) Fusing factor c) Arcing and pre arcing time
11. Cut-off current e) Rupturing current.
12. Draw typical Time-PSM curve and explain it in brief.
13. Define the following.
    a) Pick up current b) Current Setting
    c) Plug setting Multiplier d) Time setting multiplier
14. Explain various types of static overcurrent relay with block diagram.
15. Discuss the overcurrent protective scheme for radial and ring main feeder.
16. Discuss the protective scheme for earth fault and phase fault.
17. Explain microprocessor based overcurrent relay with block diagram.
18. Explain simple differential relay with neat diagram.
19. Explain percentage differential relay with neat diagram.
20. Describe microprocessor based mho & offset mho relay with block diagram and flow chart to realize its characteristics.

21. Describe microprocessor based impedance relay with block diagram and flow chart to realize its characteristics.
22. Describe microprocessor based reactance relay with block diagram and flow chart to realize its characteristics.
23. Derive an expression for a generalized mathematical equations for the operating conditions of mho & offset mho and impedance relay.
24. Explain differential protection scheme used for transformer.
25. With neat sketch explain over fluxing protection used for transformer.
26. With neat sketch explain percentage differential protection scheme for generator
27. Explain protection of generator against motoring action.
28. Explain protection against overheating due to unbalanced three phase stator current.
29. Explain restricted earth fault protection scheme used for generator
30. Explain protection of generator against excitation failure with neat diagram.
31. Explain high resistance interruption method of arc.
32. Explain current zero interruption method of arc.
33. Define the following in case of circuit breaker.
    a) Restriking voltage. b) Recovery voltage.
34. What is resistance switching? Derive an expression for critical resistance in terms of system inductance, capacitance.
35. With neat sketch explain construction & operation of air blast circuit breaker with their types.
36. With suitable diagram explain construction & operation of vacuum circuit breaker.
37. Explain construction and operation of minimum oil circuit breaker with neat diagram.
38. Explain various ratings of high voltage circuit breaker. Discuss symmetrical and asymmetrical breaking capacity and making capacity, short time current rating.
39. With neat sketch explain metal oxide Zno arrestors.
40. Write a short note on insulation coordination in power system.
41. What are the causes of over voltages in power system?
42. With a neat sketch explain different types of lightning arrestors.
43. Explain Ferranti type surge absorber with neat diagram.
44. With neat sketch explain construction & operation of thyrite type lightning arrestor.

B. Six Mark Questions

1. With a neat sketch explain electromagnetic attraction relay.
2. Explain how admittance relay is used for distance protection? Draw its characteristics on R-X diagram.
3. With a neat sketch explain theory & construction of induction disc relay.
4. With a neat sketch explain theory & construction of induction cup relay.
5. Derive torque equation for induction relay and explain its significance.
6. With a neat sketch explain electromagnetic induction relay.
7. Describe microprocessor based mho & offset mho relay with block diagram.
8. Explain protection of induction motor for different faults.
9. Explain construction, principle and operation of oil circuit breaker with neat diagram.
10. Explain the phenomenon of current chopping in circuit breaker.
11. Explain how impedance relay is used for distance protection? Draw its characteristics on R-X diagram.
12. Determine the time of operation of an IDMT relay rating 4 and having setting of 120% and TSM=0.6.The relay is connected through C.T. of 400/5A. The fault current is 3000A.The operating time for PSM of 6.25 is 2.8 Second.
13. Explain how reactance relay is used for distance protection? Draw its characteristics on R-X diagram.
14. Explain differential protection of bus bar with neat diagram.
15. With suitable diagram explain construction & operation of SF6 circuit breaker. Also state its advantages and disadvantages.
16. Explain the phenomenon of capacitive current interruption in circuit breaker with suitable waveforms.
17. Explain differential protection scheme used for transformer.
18. Explain protection of induction motor for different faults.
19. Explain construction, principle and operation of oil circuit breaker with neat diagram.
20. Explain the phenomenon of current chopping in circuit breaker
21. Briefly describe miniature circuit breaker and moduled case circuit breaker with neat diagram.
22. Explain different methods of testing of circuit breaker also discuss their merits and demerits.
23. Explain HVDC circuit breaker with neat diagram.
24. Explain the phenomenon of capacitive current interruption with suitable waveforms.
25. Derive an expression of Restriking voltage & RRRV in terms of system voltage, inductance and capacitance.

Wireless Sensor Networks

4 marks Question

1. What are the challenges and the required mechanisms of a Wireless Sensor Network?
2. Explain the various Enabling Technologies for Wireless Sensor Networks.Mention the various applications of WSN.
3. What are the Characteristics of IEEE 802.15.4.11
4. Explain in brief any two contention based protocols.
5. Explain any one schedule based protocol.

8 marks Question

1. Explain the various hardware components of Single Node architecture.
2. Explain in detail about the Gateway concepts.
3. Write notes on any 2
   (i) Dynamic Energy and power management.
   (ii) TinyOS .
   (iii) Programming Models in WSN.
4. Explain in brief about energy Consumption of Sensor nodes.
5. Explain use of MAC Protocols in directionalAntennas.
6. Explain the classes of Contention-based senderinitiated protocols
7. What are the different system power managementschemes?
8. Explain in detail about the Gateway concepts.
9. What are the various applications of wireless sensor networks and explain any two with example.

Final Year B.Tech. Sem-II,Computer Science & Engg
Elective-IV Big Data Analytics
Question Bank

1. What are the issues with the unstructured data?
2. How to deal with the unstructured data?
3. What is Big data ? What are the sources of Big Data?
4. State the characteristics of Big Data.
5. What are differences between traditional BI & Big Data?
6. Explain with diagram Big Data Technology Stack.
7. What is Big Data Analytics? Explain
8. Compare Analytics 1.0,2.0 and 3.0
9. What is Data Science ?
10. Explain the process of Data Science
11. What are the responsibilities of Data Scientist?
12. What are the advantages of In-memory data analytics and In-database processing?
13. What is the difference between parallel systems and distributed systems?
14. Distinguish between SMP & MPP.
15. What are NoSQL databases? Explain different types of NoSQL databases.
16. What are the advantages of NoSQL Databases
17. Explain different components of Hadoop ecosystem.
18. What are functions of HDFE daemons: Namenode, datanode and secondary name node?
19. With diagram. Illustrate the anatomy of File write operation in hadoop
20. What are the features of MongoDB?
21. Explain how to import data from CSV file to Mongo DB collection with example.
22. What are the replication strategies used in Cassandra?
23. Demonstrate with example CRUD operations in Cassandra.
24. Illustrate Import & Export operations with example in Cassandra.
25. Explain the components of HIVE architecture.
26. With Diagram, illustrate the working of HIVE.
27. What is partitioning & bucketing in HIVE? What are its advantages?
28. How to create partitions and buckets using Hive query language?
29. What is Static and Dynamic partitioning in HIVE?
30. Write a HIVE function to convert the values of a field to uppercase using UDFs?
31. List four important features of Pig.
32. Explain the anatomy of Pig
33. List the advantages and limitations of Pig.
34. Illustrate LOAD & STORE operators in Pig with example.
35. Illustrate Grouping & Joining operations in Pig with example.
36. Illustrate with example, how MapReduce works.
37. Distinguish between RBBMS and NoSQL.
38. What are the different types of Digital data? Mention various sources of digital data.
39. With diagram, explain the application workflow in hadoop yarn.
40. What are the functions of Application and Global resource manager in Hadoop

PAH Solapur University, Solapur
Sample Question Bank
Final Year B.Tech (Electronics) Sem-II (New w.e.f. Oct 2021) May 2022
Elective II – Data Analytics

Note: The purpose of question bank is to give students the general idea of questions in final university examination only

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Unit 1: Knowing Data

1. Justify with examples – data analytics is essential for modern businesses
2. Justify with examples – data mining is essential for modern businesses
3. Compare with examples structured and non structured data applications
4. Comment on similarities and differences – data science, data analytics, data mining, machine learning, big data
5. Comment on similarities and differences with examples– predictive Vs descriptive data mining
6. Compare – dependency oriented Vs non dependency oriented data
7. Questions based on different data types with suitable examples
8. When to use Univariate, bivariate and multivariate analysis? Justify with examples
9. Questions based on various measures of central tendency
10. Numerical questions based on various measures of central tendency
11. Questions based on various measures of spread of the data
12. Numerical questions based on various measures of spread of the data
13. Justify with suitable example– data visualization is an important phase of data science
14. Rationalize – a simple measure like Pearson's correlation coefficient conveys a lot of information about data distribution
15. What are the challenges in designing modern data science/analytics applications

Unit 2: Applications of Data Analytics

1. Questions based on overview (describing different steps involved) of various data analytics applications involving supervised / unsupervised learning. Example given below –
   According to the World Health Organization (WHO) stroke is the 2nd leading cause of death globally, responsible for approximately 11% of total deaths. A dataset of 100000 patients is available. Each record consists of twelve input parameters (which are mix of categorical and quantitative like age, gender, smoking habit) with ground truth (stroke/non stroke). Describe detailed steps of a data analytics system which predict whether a patient is likely to get stroke based on the input parameter.

2. Questions based on modern applications of data analytics with suitable examples in various fields like finance, e commerce, retails, medicine and pharmaceuticals, transport and logistics, entertainment and media, social media, search engines

Unit 3: Data Pre-processing

1. With suitable example justify the need of data pre-processing
2. Evaluate the challenges in data collection in modern applications of data analytics
3. Questions based on type of feature extraction with suitable examples
4. With suitable example justify the need of data porting
5. Questions based on porting one type of data to other
6. With suitable example justify the need of data cleaning
7. Questions based on data cleaning methods with suitable examples
8. With suitable example justify the need of data reduction
9. Questions based on data reduction techniques with suitable examples
10. With suitable example show – dimensionality reduction is possible with axis rotation
11. Questions based on dimensionality reduction techniques with suitable examples
12. With suitable example justify the need of data integration
13. Questions based on data integration techniques with suitable examples
14. With suitable example justify the need of data transformation
15. Questions based on data transformation techniques with suitable examples
16. Numerical questions based on various normalization techniques
17. Evaluate need of calculating distance between two data records in a typical data analytics application.
18. Describe the method to find similarity between two mixed attribute data records.
19. Questions based on calculation of distances between two data records for various data types – quantitative, categorical, text, binary set, time series, discrete sequences
20. Questions based on various edit distances

Unit 4: Supervised Learning Methods for Data Analytics

1. Compare with similarities, differences and applications –supervised Vs unsupervised learning
2. Compare – classification Vs regression
3. Questions based on steps in algorithms – Linear Regression, Naïve Bayes classifier, Decision Tree classifier
4. Numerical Questions based on data table provided – Linear Regression, Naïve Bayes classifier, Decision Tree classifier.

Unit 5: Unsupervised Learning Methods for Data Analytics

1. What are the different types of unsupervised learning algorithms
2. What are advantages and disadvantages of K Means Clustering?
3. Evaluate Elbow method for K Means Clustering
4. Questions based on steps in algorithms and hyper parameters – K Means Clustering, Association Rule Mining
5. Numerical Questions based on data table provided – K Means Clustering, Association Rule Mining

Unit 6: Introduction to Data Warehousing

1. Evaluate need of a data warehouse and its advantages for modern organizations
2. Compare with similarities, differences - data warehouse Vs data mart
3. What are the different data warehouse access tools?
4. Compare – operational database systems and data warehouse
5. Compare OLTP Vs OLAP
6. Describe concept of data cube
7. Questions based on various schemas with advantages and disadvantages – Star, Snowflake, Fast Constellation
8. What is concept hierarchy? How it is useful?
9. What are the steps in data warehouse design?
10. With suitable example explain two tier data warehouse architecture
11. With suitable example explain three tier data warehouse architecture

Class: T. Y. B. Tech. (CSE) Sem-II (New w.e.f. Nov. 2020)

Subject: Compiler Construction **Marks:70**

QUESTION BANK

SECTION-I

Short Answers - 4 Marks Questions (Short Notes)

1. Front end of a compiler
2. Back end of a compiler
3. L-attributed definition
4. Left factoring
5. Left recursive grammar
6. Ambiguous grammar
7. Syntax definition for a simple one pass compiler
8. Algorithm of NFA to DFA conversion
9. Inherited attributes.
10. Tokens, patterns and lexemes
11. Algorithm of NFA to DFA conversion
12. Syntax definition for a simple one pass compiler
13. LALR Parsing
14. Conversion of regular expression in to CFG
15. SLR Parser
16. Top down Parser
17. Bottom up Parsing
18. Recursive descent Parser
19. Shift Reduce Parser
20. Operator Precedence Parser

Long Answers - 8 Marks Questions

1. Elaborate the steps for FIRST & FOLLOW rules.
2. Explain its requirement & Find the FIRST & FOLLOW for the given grammar
3. How the SLR parsing table is constructed? Explain with example.
4. What is Syntax Directed definition? Explain with example
5. Explain SDD with mathematical expression example.

6. What is the role of transition diagram in recognizing tokens? Explain with the transition diagram for relational operators.
7. What is the role of transition diagram in recognizing tokens? Explain with the transition diagram for constant.
8. What is top-down parsing? Explain recursive descent parsing with example.
9. Elaborate shift-reduce parser with its conflicts & examples.
10. How the SLR parsing table is constructed? Explain with example.
11. What is Syntax Directed definition? Explain it with an mathematical expression example.
12. Translate the following statement in to a machine code by applying all the phases of the compiler and represent it with a diagram

    position := initial + rate * 60
13. Consider the unsigned numbers in Pascal as ***634, 28.37, 8.99E8, 1.89E-4***. Write a grammar for accepting these strings and prove that these strings are accepted by the grammar with the left most derivation.
14. Draw the NFA for a regular expression ***(a+b)*abb*** and convert it in to a DFA. Write all the steps of conversions
15. What is the role of Input Buffer in lexical analyzer? Elaborate the importance of the sentinels in it.

SECTION-II

Short Answers - 4 Marks Questions (Short Notes)

1. Types of three address code statements
2. Symbol table organization
3. Structure preserving transformation
4. Convert the following in to three address code

```
1. if a<b then c=a*d+c
2. else c=a-d+c
```

5. Heap allocation strategy
6. Control stack
7. Types of three address code statements
8. Symbol table organization
9. Structure preserving transformation
10. Basic Block optimization
11. Explain code generation in DAG.
12. Write a short note on flow graphs.
13. Explain different issues in design of code generator
14. Explain dynamic storage allocation

15. Explain static allocation strategies with example
16. What are the three ways of intermediate representation? Explain with example a:=b*c+b*c
17. List storage allocation strategies. Explain any one in detail
18. List and explain the functions used for Backpatching
19. Explain the concept of copy propagation
20. Write a short note on
    a. Quadruples
    b. Triples
    c. Indirect triples

Long Answers - 8 Marks Questions

1. How the three address statements are implemented using quadruples, triples & indirect triples? Elaborate with examples.
2. Brief out register descriptor & address descriptor. Write the code sequence for the statements

   ```
   d := (a-b)+(a-c)+(a-c)
   ```

   using register descriptor & address descriptor
3. What is optimization? Explain optimization of basic blocks with example.
4. How three address statements are treated by compiler phase? Elaborate
5. Write & explain translation scheme to produce three address code for assignment statements with example.
6. What is optimization? Explain structure preserving transformation with example.
7. Generation of three address code for expressions
8. Explain simple code generation algorithm with example
9. Explain peephole optimization technique
10. What is code optimization? Elaborate
11. How Loop optimization takes place? Explain with example
12. What is organization of optimization? Explain different semantic-preserving transformations with example
13. How code generation takes place in compiler? Explain
14. Generate the code for a given intermediate code.
15. Write the Syntax-directed definition for following flow-of-control statements
    a. if-then
    b. if-then-else
    c. while-do

P. A. H. Solapur University, Solapur
Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Unit 1 Introduction

1. Define embedded system. Explain major characteristics which differs embedded system from desktop computer.
2. List down the differences between RISC and CISC architecture.
3. Discuss the effect of pipeline on program execution in RISC architecture. A three stages instruction pipeline has the few stage delays. The delay of an inter-stage register stage of the pipeline is x nsec. What is the approximate speedup of the pipeline in the steady state under ideal conditions as compared to the corresponding non-pipelined implementation?
4. In RISC architecture an instruction requires four stages to execute: stage 1 (instruction fetch) = *a* ns, stage 2 (instruction decode) = *b* ns, stage 3 (instruction execute) = *d* ns and stage 4 (store results) = *c* ns. An instruction must proceed through the stages in sequence. What is the minimum asynchronous time for any single instruction to complete?
5. Sketch the general block diagram of embedded system hardware & software architecture and discuss it in detail.
6. Discuss the following design matrices which an embedded system designer should consider.
    a. Unit cost
    b. NRE cost
    c. Time-to-Market
    d. Time-to-Prototype
7. Explain the purpose & operation of assembler, linker and loader software tools.

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Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Unit 2 – ARM7 core fundamentals

1. Explain ARM programmer's model in detail (Operating modes, Register model, Program status registers, Data types etc.).
2. What is an exception? Explain vector addresses and vector table.
3. What is pipeline? Explain the effect of pipeline on program execution.
4. List all the exceptions and explain how they are handled in ARM in detail.
5. Explain LDR and STR instruction in detail with example.
6. Explain LDM and STM instruction in detail with example.
7. Explain the working of following instructions. (R7=0x00004000)
    1. LDMIA R7, {R0, R2-R4}
    2. LDMDB R7! , {R0, R2-R4}
    3. STMIA R7! , {R1-R3}
    4. STMDA R7! , {R1-R3}
8. Compare RISC and CISC architecture.
9. Evaluate the content of all registers and memory locations after the execution of following instructions independently. (R7=0x4000, R0=0x01, R1=0x02, R2=0x03, R3=0x04)
    a. LDMIA R7, {R0, R2-R3}
    b. STMDA R7! , {R1-R3}
10. Explain nomenclature used for ARM processors.
11. Explain different addressing modes of ARM7 in detail.
12. Draw and explain ARM core in detail.
13. Write an ARM ASM code to find length of null terminated string.
14. Write an ARM ASM code that copies one string over the top of another string.
15. Write an ARM ASM code to find total positive numbers from a series of 16 bit numbers.
16. What will be the content of register after the execution of given instruction?

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Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Unit 3 – Architecture of ARM7TDMI based Microcontroller

1. Discuss the all GPIO registers of LPC2148 with one example each.

2. Discuss the all pin connect block registers of LPC2148 with one example each.

3. Write a embedded C code to configure the LPC2148 port pin Pa.b as input port and if logic level is HIGH on this port pin then force logic LOW on port pin Pa.c without disturbing the functionality of other port pins.

4. Write a embedded C code to configure the LPC2148 port pin P0.a as output port without disturbing the functionality of other port pins.

5. A 10KΩ potentiometer is connected to ADC input channel ADx.y. Write a adc_init() embedded C code which configures LPC2148 port pin Pa.b for ADC without disturbing the functionality of other port pins.

6. Interface a 4x4 matrix keypad with LPC2148 and write a key_board_init() embedded C function to initialize port pins *Pa.b - Pa.e* as rows and *Pa.f - Pa.j* as columns.

7. Interface a 16x2 LCD module with LPC2148 and write a lcd_init() embedded C function to initialize port pins P0.x for RS, P0.y for EN, and *Pa.b* to *Pa.h* as data port.

***Text Book/Reference:**
LPC2148 data sheet, programming and debugging laboratory practices on LPC2148.

P. A. H. Solapur University, Solapur
Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Unit 4 – Microcontroller Interfacing and Programming

1. Explain procedure for determining PLL setting and list required conditions. Also configure CPU clock if external crystal is used as a clock source.
2. Interface LED's to LPC2148 port pins. Write an embedded C program to blink them alternately.
3. Draw and explain interfacing of LCD with LPC2148.
4. Draw and explain interfacing of keypad with LPC2148.
5. Design an embedded system with LPC2148 for the following specifications.
    a. Connect a 10KΩ potentiometer to ADC input channel.
    b. Connect a LED to port pin.

    Write an embedded C program to turn ON LED when voltage on ADC pin goes above 1V and turn OFF LED when voltage goes below 1V.
6. Interface a stepper motor with LPC2148 for the following specifications
    a. Motor is connected to port pins.
    b. Rotate motor in clockwise direction
7. Configure a 16x2 LCD module for LPC2148.
    a. Use P0.x for RS, P0.y for EN, and Pa.b to Pa.h as data port.
    b. Configure the LCD for 8/4 bit mode.
    c. Display string "Welcome" on LCD.
8. Design an embedded system with LPC2148, a temperature sensor and three LEDs (Red, Yellow, and Green).

    The system should
    a. Turn ON Green LED when temperature is below 30^0 C.
    b. Turn ON Yellow LED when temperature is between 30^0 C and 60^0 C.
    c. Turn ON Green LED when temperature is above 60^0 C.

    Draw a neat diagram and an embedded C program for
9. Design an embedded system with LPC2148 for the following specifications.
    a. Connect a potentiometer to ADC input channel.
    b. Connect a relay to port pin P0.y.

    Write an embedded C program to turn ON relay when voltage on ADC pin goes above 2V and turn OFF relay when voltage goes below 2V.

P. A. H. Solapur University, Solapur
Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Unit 5 – Real time operating system concepts

1. List down all the μcos-II RTOS features. Draw and explain the μcos-II Architecture in detail.
2. What is preemptive kernel? Elaborate in detail with example and proper diagram.
3. Discuss shared data problem and methods to solve it.
4. What is non-preemptive kernel? Elaborate in detail with example and proper diagram.
5. Discuss interrupt and interrupt timing for foreground/background, non-preemptive and preemptive kernel.
6. Explain clock tick in multitasking system. What are the constraints in selection of the clock tick in multitasking system? How accurate time this can give?
7. Define RTOS. Explain preemptive and non preemptive Kernel.
8. Define the context and context switching. What are the steps involved in μcos-II context switching? Why it puts additional burden on OS?
9. Define the context Switching. Explain with timing diagram the steps involved in µcos-II context switching?
10. Sketch and elaborate priority inversion with example and proper timing diagram.
11. Elaborate the problem of priority inversion and mechanism to prevent the same with example.
12. What is priority inversion? How to avoid it using priority inheritance?
13. Define priority inheritance also elaborate with example.
14. List down the types of priority-based kernels. Elaborate them with example.
15. How pre-emptive kernel is more responsive than non-preemptive kernel?
16. Why non-reentrant functions must not be used while using pre-emptive kernel?
17. Explain the various kernel objects for inter-process communication in μcos-II.
18. Explain the interrupt handling in μcos-II and draw the state diagram show interrupt related functions.
19. Explain the tasks involved in Embedded Systems application Cruise control.
20. What are the selection criteria of task scheduling techniques?

P. A. H. Solapur University, Solapur
Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Text Book/Reference:

1. **µC/OS-II: The Real-Time Kernel by Jean J. Labrosse – Refer chapter 02, 03**
2. **And lots of programming and debugging laboratory practices on LPC2148.**

***Note: The questions listed are model/sample questions and they may vary in format and content.**

P. A. H. Solapur University, Solapur
Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Unit 6 – RTOS programming

1. Define is a task? Sketch and elaborate different task states in detail.
2. Sketch and discuss state transition diagram for tasks in detail.
3. Explain operation and significance of the following μcos-II functions/APIs.
   i. OSStart(), OSInit(),OSIntEnter() and OSIntExit()
   ii. OSTaskCreate() & OSTaskDel()
   iii. OSMutexPost() & OSMutexPend () etc. and many more…….
4. What is a task? Elaborate the task control box (TCB) and its data in detail.
5. What is ready list in µcos-II? How µcos-II add the task in the ready list? How µcos-II remove a task from ready list?
6. What is an interrupts and elaborate the factors that contribute to interrupt response time in a system.
7. Write short note on
   i. Semaphore management in µcos-II
   ii. Mutual exclusion semaphore in µcos-II
   iii. Event flag management in µcos-II
8. State and explain the criteria for task scheduling and also elaborate various scheduling mechanisms.
9. Discuss the task scheduling.
10. Explain, Locking and unlocking of scheduler in µcos-II, nesting of scheduler lock, possible situation and precautions while using scheduler lock/unlock.
11. Elaborate with examples various inter-task/process communication tools like mailbox, message queue and semaphore used in RTOS environment.
12. Discuss various types of semaphore in detail.
13. How to use Mailox as binary semaphore. Explain by using pseudo code.
14. Enlist different MUTEX services. What configuration constants provided to configure MUTEX?
15. What are different events handled using ECB in uCOS-II. Explain data structure OS-EVENT.
16. Interface three LEDs with LPC2148. Draw a neat schematic diagram. Write a simple μcos-II program, which creates LED tasks to blink LEDs in different frequency.
17. Write an embedded C program to illustrate message queue in μcos-II for LPC2148.

18. Write an embedded C program to illustrate message mailboxes in μcos-II for LPC2148.
19. Write an embedded C program to illustrate semaphores in μcos-II for LPC2148.

Text Book/Reference:

3. **µC/OS-II: The Real-Time Kernel by Jean J. Labrosse – Refer chapter 02, 03**
4. **And lots of programming and debugging laboratory practices on LPC2148.**

***Note: The questions listed are model/sample questions and they may vary in format and content.**

Advanced Mobile Communication
Question Bank

Class: TY **Sem II** **A.Y:2021-22**

Q. No.	Questions
1	What is cellular concept? Explain it briefly.
2	What is Frequency Reuse? Explain about channel assignment strategies
3	What is Handoff? Explain different types of Handoffs?
4	What is cell splitting? Explain.
5	What is trunking and grade of service?Explain.
6	What is interference? Explain different types of Interference.
7	Explain practical link budget design using path loss model in detail.
8	Explain flat fading and frequency selective fading in detail.
9	Explain practical link budget design using path loss model in detail.
10	Derive an expression for Free space propagation Model.
11	Derive an expression for Two ground reflection Model.
12	TDMA multiple access technique for cellular system.
13	Write a short note on multiple access technique for cellular system
14	FDMA multiple access technique for cellular system
15	SSMA multiple access technique for cellular system.
16	Write comparison between FDMA,TDMA,FHMA AND SSMA.
17	SSMA multiple access technique for cellular system.
18	Explain GSM frame structure.
19	Explain GSM architecture.
20	Explain GSM common control and dedicated control channels.
21	Explain authentication and equipment identification register in GSM..
22	Explain mobile call origination sequences in GSM.
23	Explain different types of handoff in GSM.
24	Draw and explain GPRS transmission plane protocol.

25	Explain forward link and reverse link structure in IS-95 CDMAA system.
26	Discuss different service aspects of IS-95 CDMA system.
27	Brief explanation on reverse link structure in IS-95 CDMA system.
28	Explain packet and frame formats in IS-95 CDMA system
29	Describe handoff and power control in 3G system
30	Explain forward and reverse channel in CDMA 2000
31	Describe an architecture of 4G/LTE.
32	What are LTE channels.Explain
33	Describe an architecture of 5G.

Question Bank

Subject: Extra High Voltage AC Transmission System

CBCS (w.e.f. – June 2021)

Class: Final Year B.Tech (Electrical) Sem-II

I. Four Marks Questions:

1. Write a short note on Aeolian Vibration.
2. State the effect of bundled conductors on its inductance.
3. Derive the expressions for resistance and inductance of ground return.
4. Explain in detail advantages and disadvantages of high voltage
5. Describe the line parameters of modes of propagation.
6. Write a short note on Galloping Vibration.
7. Explain in detail the sequence inductance and capacitance.
8. What are the different mechanical considerations in EHV line performance?
9. What are the properties of bundled conductors in EHVAC lines?
10. Explain the relation between temperature rise and current carrying capacity of EHVAC line.
11. Write short notes on distribution of voltage gradient on sub-conductors of bundle.
12. Write a short note on attenuation of travelling waves on transmission line.
13. Explain field of sphere gap.
14. What is corona? Explain corona loss formulas in detail.
15. Explain surface voltage gradients on conductors in EHVAC
16. Explain reflection and refraction of travelling waves.
17. What is standing wave? Derive equation for open ended line double exponential response.
18. Derive differential equations and solutions for general case in travelling waves.
19. Derive equation for open ended line response to sinusoidal excitation.
20. Derive equation for line energization with trapped charge voltage.
21. Write a short note on sinusoidal excitation lumped parameter circuit.
22. Write a short note on ferro-resonance over voltages.
23. Write a short note on reduction of switching surge over voltages in EHV systems.
24. Write down the sources/causes of over voltages.
25. Explain recovery voltage and circuits breakers and its impact on over voltages.
26. Write a short note on calculation of switching surges single phase equivalents.
27. Explain the term power circle diagram and its use.

28. Write a short note on static reactive compensating system.
29. Derive the expressions for generalized constants.
30. Explain sub-synchronous resonance problem and counter measures.
31. A 100 MVA 230kV 50 Hz transformer has xt = 12% and is connected to a line 200 km long which has an inductance of 1 mH/km. The filter, connected to the LV 33 kV side of the transformer, is required to suppress the 5th harmonic generated by the TCR to 1% of In. Calculate the value of filter capacitor if the filter inductance used is 2mH.
32. Write a short note on sub-synchronous resonance in series capacitors compensated lines.
33. Explain voltage control using synchronous condenser.
34. What are the factors under steady state in design of EHV lines?
35. Explain line insulation design based upon transient overvoltages in detail.
36. Write a short note on conductor-tower, conductor-ground and conductor-conductor clearances.
37. Write a short note on air gap clearance for power frequency and lightning.

II. Six Marks Questions:

1. A power of 12000 MW is required to be transmitted over a distance of 1000 km. At voltage levels of 400 kV, 750 kV, 1000 kV and 1200 kV determine: a) Possible no. of circuits required with equal magnitudes for sending and receiving end voltages with 30° phase difference. b) The currents transmitted; and c) The total line losses Assume the value of x = 0.327, 0.272, 0.231, 0231 ohm/km for 400, 750, 1000, 1200 kV respectively.
2. Derive the equation for inductance in EHVAC transmission system.
3. Derive the equation for capacitance in EHVAC transmission system.
4. Compare various EHVAC transmission lines on the basis of power handling capacity and losses for different voltages.
5. Explain the charge potential relations of multi-conductor lines.
6. Derive equation of surface voltage gradients on conductors in EHVAC
7. Derive the expression $P_C = \frac{1}{2} KC\ (V_m^2 - V_0^2)$ for the energy loss from charge-voltage diagram.
8. Derive the expression for reflection and refraction of travelling waves.
9. What is standing wave? Derive equation for open ended line double exponential response.
10. Derive differential equations and solutions for general case in travelling waves.
11. Derive the expression sinusoidal excitation lumped parameter circuit.
12. Explain the methods of reduction of switching surge over voltages in EHV systems.
13. Explain calculation of switching surges single phase equivalents.

14. Derive the expressions for generalized constants of transmission line.
15. Explain sub-synchronous resonance problem and counter measures.
16. A 100 MVA 230kV 50 Hz transformer has xt = 12% and is connected to a line 200 km long which has an inductance of 1 mH/km. The filter, connected to the LV 33 kV side of the transformer, is required to suppress the 5th harmonic generated by the TCR to 1% of In. Calculate the value of filter capacitor if the filter inductance used is 2mH.
17. Explain the factors under steady state in design of EHV lines?
18. Explain line insulation design based upon transient overvoltages in detail.
19. Explain conductor-tower, conductor-ground and conductor-conductor clearances.

Questions Bank

S. Y. B. Tech. Electrical Engineering Semester -II
Numerical Methods and Linear Algebra

Section I

Unit 1 Solution of Algebraic & Transcendental Equations

Questions for 3 Marks

1) Using Newton Raphson method to find a root of the equation
   a) $x^3 - 3x - 5 = 0$
   b) $xe^x = cosx$
   c) $xlogx - 1.2 = 0$

2) Derive Newton iterative formula for $f(x) = \sqrt{N}$. and hence Find $\sqrt{5}$

3) Find the double root of $x^3 - 5.4x^2 + 9.24x - 5.096 = 0$, given that it is nearer to 1.5.

4) Using Newton Raphson method to find a root of the equation $e^x = x^3 + cos25x$ which is near to $x_0 = 4.5$

Questions for 5 Marks

1)

a) Solve the nonlinear equations by Newton Method up to two iteration $x^2 + y = 11, x + y^2 = 7$ with initial approximations $x_0 = 3.5, y_0 = -1.5$
b) Solve the system of non-linear equations by Newton's Method $x^2 + y^2 = 4, y + e^x = 1$ with initial approximations $x_0 = 1, y_0 = -1.7$

Unit 2 Solution of Linear and Simultaneous Equations

Questions for 3 Marks

1) Solve the system of equation by Gauss Elimination method

   a) $x + y + z = 9, 2x - 3y + 4z = 13, 3x + 4y + 5z = 40$
   b) $x + 2y + z = 3, 2x + 3y + 3z = 10, 3x - y + 2z = 13$

Questions for 3 & 5 Marks

2) By the method of Factorization solve the following system of equations.

$x + y - z = 1,\ 3x + y + z = 1,\ 4x + 3y + 2z = -1.$

$2x - y + 3z = 9,\ x + y + z = 6,\ x - y + z = 2$

Questions for 5 Marks

1) Solve the system of equation by Gauss-Seidal method (Four Iterations)

a) $27x + 6y - z = 85,\ x + y + 54z = 110,\ 6x + 15y + 2z = 72$

b) $10x + y + z = 12,\ 2x + 10y + z = 13,\ 2x + 2y + 10z = 14$

2) Solve the system of equation by Gauss-Jacobi's method (Four Iterations)

a) $20x + y - 2z = 17,\ 3x + 20y - z = -18,\ 2x - 3y + 20z = 25$

b) $10x - 5y - 2z = 3,\ 4x - 10y + 3z = -3,\ x + 6y + 10z = -3$

Unit 3 Numerical Solutions Ordinary differential Equations

Questions for 3 Marks

1) Apply Runge- Kutta method of Fourth order to solve differential Equation given that $\frac{dy}{dx} = x - y$ given $y = 1$ when $x = 0$ taking $h = 0.1$

2) Solve the differential Equation by Runge-Kutta Method of fourth order $\frac{dy}{dx} = xy^{1/3}$, given $y(1) = 1$ taking $h = 0.2$

Questions for 5 Marks

1) Apply Picard method to find the second approximation to the values of y and z given that $\frac{dy}{dx} = z,\ \frac{dz}{dx} = x^2(y + z)$ given $y = 1, z = \frac{1}{2}$ when $x = 0$ hence find y(0.1) and z(0.1)
2) Apply Runge-Kutta Method to find the second approximation to the values of y and z given that $\frac{dy}{dx} = x + z,\ \frac{dz}{dx} = x - y^2$ given $y = 2, z = 1$ when $x = 0$ hence find y(0.1) and z(0.1)

Unit 4 Numerical Integration

Questions for 3 Marks

1) Evaluate $\int_0^5 \frac{1}{2x+3}\, dx$ using n= 5 by Trapezoidal rule .

2) Evaluate $\int_0^1 \frac{1}{1+x^2}\, dx$ using n= 6 by Trapezoidal rule .

4) Find $\int_{0.2}^{1.4} (sinx - logx + e^x)\, dx$ by Simpson's 1/3rd rule taking 4 subintervals.

5) Find $\int_0^{\pi/2} e^{sinx}\, dx$ n=3 using Simpson's 1/3rd rule

6) Find $\int_0^2 \frac{1}{1+x^2}\, dx$ n=6 using Simpson's 3/8th rule

7) Evaluate $\int_4^{5.2} logx\, dx$ using n=6 by Weddle's rule.

8) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ Using Gauss formula for $n = 2, n = 3$.

9) Evaluate $\int_{-1}^1 x^3\, dx$ Using Gauss formula for $n = 2, n = 3$.

Questions for 5 Marks

1) Evaluate $\int_0^1 \frac{1}{1+x^2}\, dx$ using h=0.2 by Trapezoidal rule, Simpson's 1/3rd rule &Weddle's rule

2) Find $\int_1^2 \frac{1}{x}\, dx$ n=4 using Trapezoidal rule Simpson's 1/3rd rule

3) Evaluate $\int_0^1 \frac{1}{1+x^2} dx$ by Romberg's Integration and also find the value of π.

4) Evaluate $\int_0^1 \frac{1}{1+x} dx$ by Romberg's Integration.

5) Evaluate $\int_0^3 xe^x\, dx$ by Romberg's Integration and also find error with exact value.

Section II

Unit 5 Linear Equations and Matrix Theory

Questions for 3 Marks

1) Determine the following system of Equations having non trivial solution

$$3x_1 + 5x_2 + x_3 = 0\ , -3x_1 + 2x_2 + 3x_3 = 0\ , 5x_1 + 4x_2 - 2x_3 = 0$$

2) Describe all solutions of AX=b

$A = \begin{bmatrix} 3 & 5 & 4 \\ -1 & -2 & 4 \\ 2 & 3 & 5 \end{bmatrix}$ and b = $\begin{bmatrix} 5 \\ 1 \\ 4 \end{bmatrix}$

3) Define a linear Transformation $T: R^2 \to R^2$ by

$T(x) = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -x_2 \\ x_1 \end{bmatrix}$ Find the images under T of $= \begin{bmatrix} 4 \\ 1 \end{bmatrix}, v = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$

4) Let $V_1 = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, V_2 = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}, V_3 = \begin{bmatrix} 2 \\ 1 \\ 4 \end{bmatrix}$ Check the vectors are linearly independent or dependent

Unit 6 Vector Spaces

Questions for 3 Marks

1) For what values of h will y be in span of R^3 Let $V_1 = \begin{bmatrix} 1 \\ -1 \\ 2 \end{bmatrix}, V_2 = \begin{bmatrix} 5 \\ -4 \\ -7 \end{bmatrix}, V_3 = \begin{bmatrix} -3 \\ 1 \\ 0 \end{bmatrix}$ and $y = \begin{bmatrix} 4 \\ 3 \\ h \end{bmatrix}$.

2) Let $A = \begin{bmatrix} 2 & -1 \\ -4 & 2 \end{bmatrix}$ and $u = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ determine u belongs to Null of A

3) Let $V_1 = \begin{bmatrix} 3 \\ 0 \\ -6 \end{bmatrix}, V_2 = \begin{bmatrix} -4 \\ 1 \\ 7 \end{bmatrix}, V_3 = \begin{bmatrix} -2 \\ 1 \\ 5 \end{bmatrix}$ determine $\{V_1, V_2, V_3\}$ is a basis for R^3

4) Find the dimension of the subspace $H = \begin{Bmatrix} a - 3b + 6c \\ 5a \\ b - 2c \end{Bmatrix}$ $a, b. c \; in \; R$

5) Determine the rank of Matrix

$A = \begin{bmatrix} 2 & 5 & -3 \\ 4 & 7 & -4 \\ 6 & 9 & -5 \end{bmatrix}$

6) Write the following Difference equation

As first order system

$y_{k+3} - 2y_{k+2} - 5y_{k+1} + 6y_k = 0$ for all k

7) Verify the 1^k, $(-2)^k$, 3^k are linearly independent signals

Questions for 5 Marks

1) Determine the rank of Matrix

$A = \begin{bmatrix} 2 & 5 & -3 & -4 & 8 \\ 6 & 9 & -5 & 2 & 4 \\ 0 & -9 & 6 & 5 & -6 \end{bmatrix}$

2) Find Rank and dimNulA of matrix
$A = \begin{bmatrix} 2 & -1 & 1 & -6 & 8 \\ 1 & -2 & -4 & 3 & -2 \\ -7 & 8 & 10 & 3 & -10 \\ 4 & -5 & -7 & 0 & 4 \end{bmatrix}$

3) Let $b_1 = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$, $b_2 = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$ and $X = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$ and $\beta = \{b_1, b_2\}$ find the Coordinator Vector $[X]_\beta$ of X Relative to β .

4) Consider a basis $b_1 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$, $b_2 = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$ and $[X]_\beta = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$ and $\beta = \{b_1, b_2\}$ find the Coordinator vector.

Unit 7 Eigen Values and Eigen Vectors

Questions for 3 Marks

1) Find the Eigen values of $A = \begin{bmatrix} 1 & 2 \\ 3 & -4 \end{bmatrix}$
2) Find the Eigen values of $A = \begin{bmatrix} 2 & 1 & 1 \\ 2 & 3 & 4 \\ -1 & -1 & -2 \end{bmatrix}$
3) Find the Eigen values & Eigen Vectors of matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ -1 & -3 & -3 \\ 2 & 4 & 4 \end{bmatrix}$
4) Let $A = \begin{bmatrix} 7 & 2 \\ -4 & 1 \end{bmatrix}$ find the formula for A^k given that $A = PDP^{-1}$ where $P = \begin{bmatrix} 1 & 1 \\ -1 & -2 \end{bmatrix}$

Questions for 5 Marks

1) Diagonalize the matrix if Possible
$A = \begin{bmatrix} 1 & 3 & 3 \\ -3 & -5 & -3 \\ 3 & 3 & 1 \end{bmatrix}$ find an invertible matrix P and diagonalize matrix such that $A = PDP^{-1}$
2) Diagonalize the matrix if Possible
$A = \begin{bmatrix} 5 & 0 & 0 & 0 \\ 0 & 5 & 0 & 0 \\ 1 & 4 & -3 & 0 \\ -1 & -2 & 0 & -3 \end{bmatrix}$
3) Apply Power Method to $A = \begin{bmatrix} 6 & 5 \\ 1 & 2 \end{bmatrix}$ with $X_0 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ stop when $k = 5$.

4) Find Eigen Values and Eigen Vectors for Complex Eigen Values
$A = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$

Unit 8 Inner Product and Orthogonality

Questions for 3 Marks

1) Show that $\{u_1, u_2, u_3\}$ is an orthogonal Matrix where Let $u_1 = \begin{bmatrix} 3 \\ 1 \\ 1 \end{bmatrix}$, $u_2 = \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix}$, $u_3 = \begin{bmatrix} -1/2 \\ -2 \\ 7/2 \end{bmatrix}$

2) Show that the quadratic form $3{x_1}^2 + 5{x_2}^2 + 3{x_3}^2 - 2x_1x_2 + 2x_1x_3 - 2x_2x_3$ is positive definite.

3) Find the Matrix in quadratic form $8{x_1}^2 + 7{x_2}^2 - 3{x_3}^2 - 6x_1x_2 + 4x_1x_3 - 2x_2x_3$

Questions for 5 Marks

1) Find Least Square solutions of the inconsistent system Ax=b for

$$A = \begin{bmatrix} 4 & 0 \\ 0 & 2 \\ 1 & 1 \end{bmatrix} \text{ and } b = \begin{bmatrix} 2 \\ 0 \\ 11 \end{bmatrix}$$

2) Find Least Square solutions of the inconsistent system Ax=b for

$$A = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \end{bmatrix} \text{ and } b = \begin{bmatrix} -3 \\ -1 \\ 0 \\ 2 \\ 5 \\ 1 \end{bmatrix}$$

3) If possible diagonalize the symmetric Matrices

$$A = \begin{bmatrix} 6 & -2 & -1 \\ -2 & 6 & -1 \\ -1 & -1 & 5 \end{bmatrix}$$

QUESTION BANK

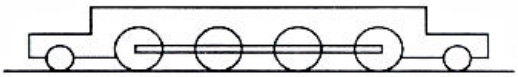
CIVIL ENGINEERING DEPARTMENT

Course-Final Year BTech-Part-II- 2021-22

Semester-II

Subject: Railway & Harbour Engineering

SECTION-I -RAILWAY ENGINEERING

Sl. No	Questions
1	Classify the various gauges prevailing in India with their gauge widths. What factors govern the selection of a suitable gauge? Discuss
2	What do you understand by a railway track or a permanent way? Mention the requirements of an ideal Permanent way. Draw a neat sketch of BG double track in embankment and show all component parts.
3	What is meant by track modulus? Indicate the usual range of values for a BG track.
4	What are the functions of rails? Name the various types of rails in use. Which one is widely used now? How is the weight of a rail section usually determined?
	What is meant by wear of rails? Categorize the types of rail wear and enumerate the methods by which wear in rails can be measured.
5	It is observed that at present tracks, are mostly laid with flat-footed rails. Justify this preference in relation to other types of rail sections.
6	A locomotive as shown in fig. 2-1 is required to haul a train at 80 km p.h. The axle load of the driving wheels of the engine is 22.50 tonnes. The train is to run on a straight level track. Find the maximum permissible train load that the engine can pull. If the train climbs a gradient of 1 in 200, how much of the speed should be reduced?  2-8-2 Locomotive **Fig. 2-1**
7	A BG locomotive has three pairs of driving wheels with an axle load of 20 t. If this locomotive is running at a speed of 120 km/h, what is the train weight in t that the locomotive can pull on a straight level track? (b) What is the train weight that the same locomotive will be able to haul on a 2° curve and a 1 in 100 gradient?
8	Compare the various characteristics of steam, diesel and electric traction
9	Why is it desirable to have, as far as possible, a uniform gauge for the railway network of a country support this with proper justification.

Sl. No	Questions
10	List out the various gauges prevailing in India with their gauge widths.
11	In the process of selecting a suitable alignment for a railway line, what factors and parameters are kept in view? What analysis is done to assess the economic viability of the alignment?
12	Explain the following briefly (a) reconnaissance survey, (b) preliminary survey, (c) final location survey
13	Illustrate with sketches the various fastenings used to fasten rails to sleepers. Discuss their merits and demerits
14	Explain briefly the functions of the following in a railway track. (a) Hook bolt (b) Fish plate (c) Tie bar (d) Cotters (e) Screw spike
15	What are the advantages and disadvantages of bearing plates?
16	What are the requirements of an elastic fastening? Briefly describe the various elastic fastenings being used on Indian Railways
17	What do you understand by a term coning of wheel, adzing of sleepers and tilting of rails?
18	Draw a typical cross section of a permanent way. Describe briefly the functions of the various components of the railway track.
19	List the various types of sleepers used on Indian Railways. Which one would you consider to be the best for modern tracks and why?
20	Compare the characteristics of the different types of sleepers used in our country.
21	Compare the characteristics of wooden sleepers and reinforced concrete sleepers used on Indian Railways.
22	Explain the functions of sleepers and ballast in a railway track. Explain how the spacing of sleepers is determined. Give specific reasons for the necessity of regular maintenance of the ballast.
23	What is the ballast? Why is it used in the railway track? Briefly describe the various types of ballasts used.
24	Determine the optimum thickness of the stone ballast required below sleepers of density M + 7 on a BG track
25	List the various types of sleepers used on Indian Railways. Which one would you consider to be the best for modern tracks and why? Using a sleeper density of N + 5, determine the number of sleepers required for the construction of a 1800-m BG track

Sl. No	Questions
26	Define 'creep of rail'. What are its effects?
27	What are the various theories that have been put forward to explain the development of creep? Describe wave motion theory
28	What are the causes of creep? How can creep be adjusted?
29	Define (a) ruling gradient, (b) pusher gradient, (c) momentum gradient, and (d) Compensated gradient for curvature.
30	Find the gradient for a broad-gauge track where the grade resistance together with curve resistance due to a 2° curve is equal to the resistance due to a ruling gradient of 1 in 200.
31	What is superelevation? Why is it necessary to provide superelevation on the curves of a railway track? Derive the equation of Superelevation required on curves.
32	A 7° curve track diverges from a main curve of 4° in the opposite direction. In the layout of a BG yard, calculate the superelevation and the speed on the branch line when the maximum speed permitted on the main line is 45 km/h.
33	For a main line and a branch line on 5° curves, calculate the superelevation and the speed on the branch line if the maximum speed permitted on the main line is 48 km/h.
34	Define the terms equilibrium cant and cant deficiency on a railway track. Calculate cant deficiency for a 4° curve on a BG track.
35	A 6° curve diverges from a 3° main curve in the reverse direction in the layout of a broad-gauge yard. If the speed on the branch line is restricted to 35 km/h, determine the restricted speed on the main line.
36	Calculate the maximum permissible speed on a curve on a Rajdhani route with a maximum sanctioned speed of 130 km/h. The superelevation provided is 50 mm and the transition length is 60 m.
37	Explain the following terms and state the circumstances under which they occur: (a) Negative superelevation (b) Grade compensation on curves
38	Explain the objective of providing transition curves on either side of a circular curve
39	Outline the objectives of transition curve and calculate the length of transition curve and the shift using the following data. Use of Railway Board formula. a) Design speed=90kmph for B.G track b) Allowable rate of introduction of super elevation=1 in 360 c) Cant deficiency=7.6cm Draw the offsets at 15m interval
40	Differentiate between the hauling capacity and the tractive effort of a locomotive.

Sl. No	Questions
41	a) A BG locomotive has three pairs of driving wheels with an axle load of 20 t. If this locomotive is running at a speed of 120 km/h, what is the train weight in t that the locomotive can pull on a straight level track? b) What is the train weight that the same locomotive will be able to haul on a 2° curve and a 1 in 100 gradient?
42	List and explain the various resistances that a locomotive in motion has to overcome.
43	Compare the various characteristics of steam, diesel and electric traction
44	Determine the maximum permissible train load that a locomotive with four pairs of driving wheels of a 22.86 t axle load each can pull on a level broad gauge track at a speed of 90 km/h. Also determine the reduced speed of the train if it has to ascend a gradient of 1 in 200 with the same train load. (Assume the hauling capacity of the locomotive to be one-sixth of the load on the driving wheels).
45	Name six materials commonly used as ballast on Indian Railways. Write down the specifications of an ideal stone ballast. Determine the optimum thickness of the stone ballast required below sleepers of density M + 7 on a BG track.
46	Draw a neat sketch of a right-hand turnout taking off from a straight broad gauge track and name thereon the various component parts and important terms connected with the layout.
47	Draw a neat diagram of left-hand turnout and describe the following terms: (1) Heel divergence (2) Switch angle (3) Actual nose of crossing (4) Throw of switch.
48	What is meant by a crossing number and a crossing angle? How is crossing angle determined? Explain methods for the same.
49	A turnout is to be laid off a straight broad-gauge track with a 1 in 12 crossing. Determine the lead and radius for the turnout given the following data heel divergence d = 133 mm, the straight length between the TNC and the tangent point of the crossing curve, h = 1.418 m, crossing angle $\alpha = 4°45'49"$, and switch angle $\beta = 1°9'00"$.
50	Calculate the elements required to set out a 1 in 12 turnout taking off from a straight BG track, with its curve starting from the heel of the switch and ending at a distance of 864 mm from the TNC, given that the heel divergence is 136 mm and the switch angle is 1° 34' 27". Make a freehand sketch showing the values of the calculated elements.
51	Calculate all the necessary elements required to set out a 1 in 12 turnout, taking off from a straight BG track with its curve starting from the toe of the switch i.e. tangential to the gauge face of the outer main rail & passes through TNC. (Heel divergence, d = 11.4cm). Make a freehand sketch showing the values of the calculated elements.
52	On a straight broad gauge track a turnout takes off at an angle of 6° 42' 35". Design the turnout when it is given that the switch angle is equal to 1° 34' 27" and the length of the switch rails is 4.73 m. The heel divergence is 11.43 cm. The straight arm is 0.85 m long.

Sl. No	Questions
53	Differentiate between the following: a) Facing points and trailing points b) Acute angle crossing and obtuse angle of crossing c) Switch lead and Curve lead d) Right hand and Left-Hand turnout
54	Design a turnout with 1 in 12 crossings from the following data: Gauge=Broad Gauge Heel Divergence=13.3cm Straight arm=1.346m Angle of switch=1^0 8' 00'' Sketch the layout showing all calculated values.
55	What is meant by a crossing number and a crossing angle? How is crossing angle determined? Explain methods for the same.
56	What basic factors do you consider in designing turnout? Describe any one method, giving calculations of Lead, Radius and heel divergence. Which of the method is best out of the available methods and why?
57	A turnout is to be laid off a straight broad-gauge track with a 1 in 12 crossing. Determine the lead and radius for the turnout given the following data heel divergence d = 133 mm, the straight length between the TNC and the tangent point of the crossing curve, h = 1.418 m, crossing angle $\alpha = 4°45'49''$, and switch angle $\beta = 1°9'00''$.
58	Draw a neat sketch of a right-hand turnout of a B.G. track and describe the significance of wing rail, check rail and tongue rail
59	Work out the quantities of the various track materials required for laying a single-line BG track for a length of 1 km. Make suitable assumptions for all the other data that may be required
60	Briefly discuss the various steps involved in the construction of a new BG railway line
61	What are the objectives of interlocking? Explain the tappet and lock system of interlocking.
62	Illustrate the working principle of absolute block system of controlling the movement of trains for single and double lines.
63	Differentiate between the following: a) Reception signals and departure signals b) Semaphore signal and warner signal c) Repeating signal and co-acting signal

Sl. No	Questions
	d) Absolute block system and Pilot guard system
64	Illustrate the working principle of key interlocking and mechanical interlocking with merits and de-merits.

SECTION-II-AIRPORT ENGINEERING

1	Describe in details with sketches approach zone, clear zone and turning zone.
2	What are the factors to be considered for the selection of site of an airport? Explain the importance of each factor.
3	Write a short note on i) Cross wind component ii) Wind Coverage iii) Runway orientation.
4	Enlist the various runway geometrics as recommended by ICAO. Discuss one in detail
5	Draw a neat cross-section of runway showing all component parts. Explain the ICAO recommendations with respect to runway transverse and longitudinal gradients for A, B, C, D and E types of airports.
6	What is significance of Wind Rose Diagram in finding orientation of runway and demonstrate the Type-II wind rose diagram with neat sketch.
7	Write a short notes on any two with neat sketches a) Beacon light b) Runway lighting c) Displaced Threshold marking.
8	What are the imaginary surfaces? What is their significance and list the types of imaginary surfaces?
9	The following is the average wind data for 10 years. An airport is to be designed for a single runway. Determine the maximum wind coverage and the best direction of runway.

TABLE 4-1
TYPICAL WIND DATA

Wind direction	Percentage of time			Total percentage in each direction
	6-25 km p.h.	25-50 km p.h.	50-80 km p.h.	
N	4.6	1.40	0.10	6.10
NNE	3.4	0.75	0.00	4.15
NE	1.8	0.03	0.10	1.93
ENE	2.8	0.02	0.03	2.85
E	2.1	2.20	0.00	4.30
ESE	5.4	4.75	0.00	10.15
SE	6.4	1.40	0.00	7.80
SSE	7.5	0.02	0.00	7.52
S	4.6	1.40	0.10	6.10
SSW	2.4	0.75	0.00	3.15
SW	1.2	0.03	0.10	1.33
WSW	3.6	0.02	0.03	3.65
W	1.8	2.20	0.00	4.00
WNW	6.0	4.75	0.00	10.75
NW	5.9	1.40	0.00	7.30
NNW	6.9	0.02	0.00	6.92
Total	66.4	21.14	0.46	88.00

11 For the following data, plot Type-I wind rose diagram and find the orientation of runway, calm period and percentage of wind coverage.

Wind Direction	**Duration of wind in % of time**	**Wind Direction**	**Duration of wind in % of time**
N	6.1	S	6.10
NNE	4.15	SSW	3.15
NE	1.93	SW	1.33
ENE	2.85	WSW	3.65
E	4.3	W	4.00
ESE	10.15	WNW	10.75
SE	7.80	NW	7.3
SSE	7.52	NNW	6.92

12 Explain how the basic runway length is determined on the basis of the performance characteristics of jet and conventional engine aircrafts.

13 Calculate the actual length of the runway from the following data:

Airport elevation: R.L.105
Airport reference temperature: 28^0C
Basic length of runway: 800m
Highest point along the length: R.L 98.2 Lowest point along the length: R.L 95.2.

Check the total correction for elevation plus temperature as per ICAO

<table>
<tr><td>14</td><td>Determine turning radius of taxiway

a) Wheel base-17.70 m
b) Tread of main loading gear-6.62 m
c) Turning speed-40kmph
d) Coefficient of friction between tyre and pavement surface-0.13 and width of taxiway-22.5m</td></tr>
<tr><td>15</td><td>Design an exit taxiway joining a runway and a parallel main taxiway. The total angle of turn is 35^0 and the maximum turn-off speed is 80 kmph. Assume radius of entrance curve =731m, runway width=45m, taxiway width=22.5m. Draw a neat sketch showing all the design elements. Assume the separation clearance as 217.75m.</td></tr>
<tr><td>16</td><td>Design an exit taxiway joining a runway and a parallel main taxiway. The total angle of turn is 30 degrees and the maximum turn-off speed is 80 kmph. Assume runway width=45m, taxiway width=22.5m and separation clearance as 198.70m. Use Table-1 for obtaining the radius of entrance curve. Draw a neat sketch showing all the design elements.

Table-1: Radius of entrance curve
<table><tr><td>Speed (kmph)</td><td>65</td><td>80</td><td>95</td></tr><tr><td>Radius (m)</td><td>517</td><td>731</td><td>941</td></tr></table></td></tr>
<tr><td>17</td><td>What are the imaginary surfaces? What is their significance and list the types of imaginary surfaces?</td></tr>
<tr><td>18</td><td>What is significance of Wind Rose Diagram in finding orientation of runway and demonstrate the Type-I wind rose diagram with neat sketch.</td></tr>
<tr><td>19</td><td>At an airport site at sea level with standard atmospheric conditions, the runway lengths required for take-off and landing are 2000 m and 2400m respectively. The proposed airport is situated at an altitude of 150m. If the airport reference temperature is 25^0C and the effective runway gradient is 0.35 percent, calculate the length of runway to be provided.</td></tr>
<tr><td>20</td><td>Length of run way under standard condition is 1800m.the airport site has an elevation of 220m.reference temperature is 32.94ºC if the runway is to be constructed with effective gradient of 0.2%. Determine corrected runway length.</td></tr>
<tr><td>21</td><td>Design an exit taxiway joining a runway and a parallel main taxiway. The total angle of turn is 38^0 and the maximum turn-off speed is 90 kmph. Assume radius of entrance curve =731m, runway width=45m, taxiway width=22.5m. Draw a neat sketch showing all the design elements. Assume the separation clearance as 217.75m</td></tr>
<tr><td>22</td><td>Explain with neat sketches the limiting heights of objects in the approach and turning zone of an instrumental runway.</td></tr>
</table>

23	The monthly mean temperature of the atmosphere at a particular site where an airport is to be developed, are given below. Determine the airport reference temperature. If the site is at mean sea level determine the actual runway length. The runway is assumed to be level.

Month	Temperature		Month	Temperature	
	Mean Ave. Daily	Mean Max Daily		Mean Aver Daily	Mean Max Daily
January	3	5	July	32	37
February	15	17	August	30	35
March	20	23	September	27	31
April	25	32	October	22	28
May	35	47	November	12	18
June	40	50	December	6	9

24	The monthly mean temperatures of the atmosphere, at a particular site, where an airport has to be developed, are given below. Determine the air force reference temperature. If the site is at mean sea level, determine the actual runway length. The runway is assumed to be level.

Month	Temperature ^{0}C	
	Mean value of average daily	Mean value of Maximum daily
January	3	5
February	15	17
March	20	23
April	25	32
May	35	47
June	40	50
July	32	37
August	30	35
September	27	31
October	22	28
November	12	18
December	6	9

25	Explain the various factors which affect the location of exit taxiways.
26	Write a short note on any two with neat sketches a) Comical surface b) Separation clearance c) Taxiway lighting
27	Determine the turning radius of the taxiway for a supersonic transport aircraft with a wheel base of 30m and tread of main loading gear as 6 m for a design turning speed of 50kmph. Assume co-efficient of friction between tyre and pavement surface as 0.13 and width of taxiway pavement as 22.50m.
28	Design an exit taxiway joining a runway and a parallel main taxiway. The total angle of turn is 30 degrees and the maximum turn-off speed is 80 kmph. Assume runway width=45m,

taxiway width=22.5m and separation clearance as 198.70m. Use Table-1 for obtaining the radius of entrance curve. Draw a neat sketch showing all the design elements.

Table-1: Radius of entrance curve

Speed (kmph)	*65*	*80*	*95*
Radius (m)	*517*	*731*	*941*

29 The length of a runway under standard conditions is 2100m. The airport is to be provided at elevation of 410m above the mean sea level. The airport reference temperature is 32^0C. Determine the length of runway. Apply correctios for elevation and temperature as per ICAO and for gradient as per FAA specifications. The construction plan provides following data:

End to end of runway(m) 0-320	0 to 320	300 to 900	900 to 1500	1500 to 1800	1800 to 2100	2100 to 2700	2700 to 3000
Grade (%)	+1.00	-0.50	+0.50	+1.00	-0.50	-0.40	-0.10

Harbour Engineering

01	Draw a typical layout of artificial harbour and explain briefly, the function of Jetty, Quay walls and turning basin.
02	Briefly discuss on relevance of wind tides and littoral currents on the design of harbours.
04	Define the term harbour. Explain various classifications of harbours.
05	What re factors to be considered while selecting a site for a harbour.
06	What are dolphins? Describe their types.
07	What are the fenders? Why are they used? Describe various types of fenders with sketches.
08	Draw a neat sketch of dry dock (plan and section) and label all components, and explain the working principle of dry dock.
10	What is breakwater? Explain mound type of breakwater with neat sketch.
11	Write a short note on any two a) Natural Harbour b) Quays & Jetties c) Tetra pods

12	Discuss types of gravity wharves.
13	Write a brief note on Light house and Light ships
14	Why it is necessary to provide facilities like aprons, transit sheds, and warehouses at the ports?

COURSE COORDINATOR
(Ashok Kumar N. Rajanavar)

T. Y. B.Tech (E &TC) Sem II (w.e.f. Oct 2020)

Open Elective-I: Sensors &Applications

Section I

4 Marks Questions

1 Differentiate between Sensors with Transducers

2 Describe Classifications of Sensors

3. Explain Temperature Compensation of Resistive Bridge-

4 Describe following terms- a) Accuracy b) Calibration and Calibration Error

c) Repeatability d) Dead band

5 Explain Dynamic Characteristics of sensors

6. How capacitor is capable to measure physical quantity? Explain fundamental properties of capacitor with necessary diagrams.

7 Explain Hall Effect sensors along with applications.

8 Describe heat transfer mechanism of Thermal Conduction

9. Describe heat transfer mechanism of Thermal Convection

10. Describe heat transfer mechanism of Thermal Radiation

11 How Dynamic Models of Sensor Elements classified in various domains

12Describe piezoelectric property of a material. State various applications of it.

13 Explain working of Voltage follower and Instrumentation amplifier

14 With necessary connection diagram describe current excitation and voltage excitation circuits.

15 Explain Successive-Approximation Converter

16 Explain Null-Balanced Bridge circuits in detail.

17 How data transmission carried out using Two-Wire Transmission

18 How data transmission carried out using Four-Wire Sensing

19. How data transmission carried out using Six-Wire Sensing

20 Explain concept of Electric Charge, Fields and potential

21, Explain concept of Electrical Fields and potential

22. Explain concept of potential.

23.Explain Capacitance & Magnetism

24. Write short note on Light

25. Explain Input Characteristics of Interface Circuits

6 Marks Questions

1.With the help of neat sketch explain concept of amplifiers

2. Illustrate different excitation circuits

3. Explain concept of Analog to digital converter

4. Describe bridge Circuit in detail

5 explain characteristics of sensors.

6. Describe four wire sensing & six wire sensing

7. Explain Direct Digitization

8. Describe Thermal Properties of Materials

9. Explain Dynamic Models of Sensor Elements in detail

10. Why ADC is used while output of sensor is connected to Microcontrollers? Explain V/F Converters, Dual Slope converters and Successive-Approximation Converter with necessary Diagrams

11. Explain Dual Slope converters

12. Describe V/Converters

13. Explain Units of measurements in details

14. Explain classification of sensor

15. Write note on signals & system

Section II

4 Marks Questions

1. Explain Occupancy of sensor

2. Illustrate Motion Detectors of sensor

3. Explain concept of Position, Displacement, and Level of sensor

4. Explain concept of Velocity of sensor

5. Explain concept of Acceleration of sensor

6. Describe concept of force

7. Describe concept Strain

8. Explain Tactile Sensors with neat sketch

9. Explain types of Temperature Sensors

10 write short note on Light Detectors

11. Illustrate sensor materials

12. Explain Surface processing of sensors

13. Describe Nano technology

14. With the help of neat sketch explain Principle of Operation of Electrical Actuators

15. With the help of neat sketch explain Principle of Operation of Electromagnetic Actuators

16. With the help of neat sketch explain Principle of Operation of Electromechanical Actuators

17. With the help of neat sketch explain Principle of Operation of Hydraulic actuator

18. . With the help of neat sketch explain Principle of Operation of Pneumatic Actuators

19. With the help of neat sketch explain Principle of Operation of Micro actuators

20. With the help of neat sketch explain Principle of Operation of Nano actuators

21Explain Selection Criteria of actuators

22. Describe Humidity sensor in detail

23. Explain types of actuators

24. Describe moisture sensor in details

25. Describe Light detector sensor in details

6 Marks Questions

1. Explain types of Pressure Sensors in details

2. With the help of neat sketch explain Tactile Sensors
3. With the help of neat sketch explain types of Temperature Sensors
4. With the help of neat sketch explain concept of Light Detectors
5. Write short note on Tactile Sensors
6. Explain the term Velocity & Acceleration
7. Explain any two types of actuators in detail
8. Explain the concept of sensor materials
9. With the help of neat sketch explain Principle of Operation of Electromagnetic Actuators & Electromechanical Actuators
10. Compare Electromagnetic Actuators& Electromechanical Actuators
11. Compare Hydraulic and Pneumatic Actuators
12. Compare Micro- and Nano actuators
13. Illustrate surface processing of sensor
14. Write short note on motion detector
15. Define following terms
    Displacement, Level, Velocity, Acceleration

T. Y. B.Tech (E &TC) Sem II (w.e.f. Oct 2020)

Open Elective-I: Sensors &Applications

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    Displacement, Level, Velocity, Acceleration

SEAT No.: SET-A

TY. B.Tech(Part-I)(new) Examination Apr/May-2022

Electronics Engineering

Microcontrollers

Section-I

Q.2 Attempt any three. 12

1) Explain in brief the types of Interrupts available in 8085.

2) What is microprocessor? Give the power supply &clock frequency of 8085.

3) What are the functions of an accumulator?

4) Explain the 16 – bit registers of 8085 microprocessor..

5) Explain priority interrupts of 8085?

6) What is the signal classification of 8085?

7) Define instruction cycle, machine cycle and T-state?

8) Give the register organization of 8085?

9) explain flags in 8085

10) Difference between memory mapped I/O and peripheral I/O?

11) Write an assembly program to find greatest between two numbers in 8085.

12) Differentiate between program memory and data memory in 8051

13) Give the addressing modes of 8051?

14) What is indexed addressing in 8051?

15) Write a program to save the accumulator in r7 of bank 2 in 8051.

Q.3 Attempt any two.

1) Explain The 8085 instruction set.

2) Explain The 8085 Addressing Modes with examples.

3) Explain the microcontroller 8051 Architecture .

4) List out the five categories of the 8085 instructions. Give e.g. of the instructions for each group ?

5)Explain about 8085- a) what is the difference between a JMP instruction and CALL instruction . b) What is the difference between the shift and rotate instructions?

6) Explain Serial Port Programming in 8051

7) What Events Can Trigger interrupts, and where do they go in 8051?

8) Explain UART communication in 8051

9) Explain interfacing of external memory with 8051.

10) write a short note on timers and counters in 8051.

Section-II

Q.4 Attempt any three.

1) Explain Interfacing a 8051 to matrix Keyboard

2) Explain Interfacing a 8051 to stepper motor.

3) write the steps in interfacing the LCD with 8051

4) Explain Timer0 module in PIC 16F877A

5) Explain indirect Addressing Modes of PIC 16F877A

6) Explain the various SFRs of 8051.

7) Explain Harvard architecture in PIC with diagram

8) Write the instruction set for 16F877 with example.

9) Explain Parallel slave port communication in 16F877

10) How ADC works in 16F877?

11) compare Synchronous and asynchronous communication in 16F877

12) How PWM module works in 16F877?

13) Explain working of ports of 8051

14) Compare SPI and IIC module in MSSP in PIC.

15) Which functions are set through Configuration word in PIC16F877A?

Q.5 Attempt any two.

1) Interface Stepper Motor with 8051.
2) Explain architecture of PIC 16F877 microcontroller
3) Discuss interfacing of external 4K EPROM and 4K RAM with the microcontroller 8051.
4) Explain interfacing of stepper motor with microcontroller. Write program to rotate stepper motor in clockwise direction continuously in full step mode.
5) What is the CCP module in PIC 16F877A/ Explain in detail
6) Explain ADC interfacing with 8051 and its program.
7) Write a short note on a) SPI module b) I2C module.
8) Write a assembly program to interface LED and Switch with 16F877.
9) Write an 8051 assembly program to toggle all the bits of port 1 continuously with 2s delay,when interrupt 0 (INT0) is generated. Use timer 0, 16- bit mode to generate the delay of 01 Sec.
10) Write features, draw architecture of PIC 16F877 .

Name: K.R. Pardeshi

Designation: Assistant Professor

Department: Computer Science & Engg Dept

College: Walchand Institute of Technology, Solapur

Subject: Unix Operating System

Class T.Y. BTech (CSE)

Question Bank

Answer in Short (4-5 marks Question)

Unit 1: Introduction

1. List features of Unix Operating System.
2. What will be the output of below given commands:
    1. who 2. ls 3. cd /usr/src/uts 4. cd ../.. 5. Whoami
3. Give the difference between user mode and kernel mode and how processes execute in these modes.
4. Give the difference between Interrupts and exceptions.
5. Describe file system layout.
6. Explain how file system is organized in UNIX.
7. Explain how kernel prevent occurance of interrupts during critical execution, using processor execution level.
8. Describe data structure used by the processes.
9. Why Unix is called as multiprogramming? Give an example and explain.
10. What should happen if the kernel attempts to awaken all processes sleeping on an event, but no processes are asleep on the event at the time of the wakeup?

Unit 2: Buffer Cache

1. While executing algorithms related to buffer, the kernel must raise the processor execution level to block the interrupts? Why?
2. Explain Buffer Header in detail
3. Explain algorithm for writing the contents to disk block.

4. Explain Advantages and disadvantages of Buffer Cache

Unit 3: Internal Representation of files

1. Example to find block number and calculate byte offset for given inode number
2. Explain namei algorithm
3. What is superblock? List fields present in superblock

Unit 4: System Calls

Write a short note on

1. *chown* and *chmod* system call.
2. *mount* system call in detail.
3. c*reat* System call.
4. lseek, seek
5. link, unlink
6. pipe
7. DUP system calls.
8. Stat , fstat

Unit 5: Structure of Process

1.Explain the significance of ***setjmp*** and ***longjmp*** algorithm.

Unit 6: Process Control

1. What is signal? How are they classified in Unix System V.
2. Explain operations performed by kernel in handling Interrupts and Exceptions.
3. Explain ***system boot*** and ***init*** process
4. Explain ***kill*** system call
5. Explain Different **time related system call**
6. explain Fair-Share Scheduler.

Unit: 7 Memory Management

1. Explain Fork Swap
2. Explain expansion swap

Answer in brief (7-8 marks question)

Unit 1: Introduction

1. Explain Architecture of UNIX operating System
2. Draw and explain the block diagram of UNIX operating System
3. Which are the different kernel data structures used by file subsystem? Also explain the file system Layout

Unit 2: Buffer Cache

1. Explain scenarios of *getblk* algorithm in detail.
2. Explain algorithm for reading a disk block.

Unit 3: Internal Representation of files

1. What is an inode? List the fields of Disk Inode and In-core Inode. Also write sample disk inode.
2. Explain in detail, How kernel assign an inode to a new file, and how kernel free an inode from file.
3. To keep inode structure small yet still allow large files, how the table of contents of disk blocks are arranged in the System V UNIX.
4. Explain how kernel reads the contents of disk block and write it into the buffer

Unit 5: Structure of Process

1. Explain Process State Transition Diagram in detail
2. What is an U area? Describe the different fields in the U area, in detail
3. Explain in Detail the context of a Process

Unit 6: Process Control

1. What is signal? How signal are classified? Write and explain algorithm which recognizes signal
2. Write and explain algorithm which handles signal
3. How Process synchronize its execution with termination of child process. Explain with algorithm.
4. Explain fork system call in detail.

Unit: 7 Memory Management

1. Explain How kernel manages space on swap device in detail.
2. Explain data structure used in demand paging.

3. Explain Fork in paging system
4. Explain Exec in paging system
5. Explain Page Stealer Process in detail
6. What is page fault? Explain Validity Fault handler?
7. Explain Protection Page fault handler in detail

T.Y. B.Tech. (Electronics & Tele Communication Engg.)(Part-II)

(w.e.f. June 2020-21)(CBCS)

EMBEDDED SYSTEMS

Question Bank

I)Short Answer Questions

1. Explain Embedded system Design challenges.

2. Explain any four major design metrics of Embedded system.

3. Explain in brief operating modes of ARM7 processor.

4. Explain the concept of memory management in embedded system design.

5. Explain any four arithmetic instructions with suitable examples.

6. Explain Task states associated with MuCOSII.

7. Write about Kernel services in RTOS.

8. Explain internal A/D module of ARM7.

9. Explain event functions in RTOS.

10. Explain Timer function in RTOS.

11.Describe operation for following instructions with example:

A) MVN B) LSL C) ADD D) ORR E) CMN

12.Describe Features of LPC2148.

13.Explain with example Pipeline concept used in ARM processor.

14.Explain concept of RTC in LPC2148.

15. Explain queue, mailbox and pipes.

16. Explain in detail PWM module of ARM processor.

17. Define RTOS. Explain its function.

18. Draw and explain block diagram of digital camera.

19. Describe concept of semaphore with example.

20. Explain memory map for LPC2148.

21.Explain SSP Serial I/O controller for LPC2148.

22.Explain Time-to-Market design metrics in detail.

23.Explain the working of following instructions. (R7=0x00004000)

1. LDMIA R7,{R0,R2-R4}
2. LDMDB R7!,{R0,R2-R4}
3. STMIA R7!,{R1-R3}

24. Define context, interrupt latency, interrupt response time and interrupt recovery time.

25. Explain memory management in MuCOS II and RTOS.

26. List features of UCOSII RTOS.

27. Explain Embedded communication using SPI.

28.If size of a embedded system product is reduced then Explore the effect on NRE cost design metrics.

29. Illustrate the functioning of Barrel shifter of ARM7TDMI core.

30. List operating states & instruction sets features of ARM7TDMI processor.

31. Describe various registers used for ARM7 GPIO Programming.

32. What are various operating modes of ARM7 processor? Distinguish between privileged and Non privileged operating modes?

33. Describe registers IOxPIN, IODIRx, IOSETx, IOCLRx of ARM7.

34. What are various Banked registers of ARM7 processor? Describe operating mode change.

35. Describe various exceptions supported by ARM architecture

36. Explain following ARM instructions
MVN Rd, #N
BEQ Label
ADC Rd,Rn,#N
EOR Rd, Rd

37. Explain with example 3 stage pipeline architecture used in ARM processor.

38. Illustrate Bus architecture in ARM7TDMI processor.

39. Describe different load & store instructions of ARM processor.

40. Explore with suitable example pre-indexing & post-indexing addressing modes for LDR/STR instructions.

41. Explain following ARM instructions
MOVS Rd, Rn
MOV Rd, Rn, LSL#02
SBC Rd, Rn, #N
CMP, Rm, #N

II)Long Answer Questions

1. Draw and explain with block diagram architecture of LPC2148.

2. Draw and explain block diagram of interfacing LED with ARM processor with program.

3. Explain exceptions, interrups and vector table for ARM processor. What is TCM?

4. Explain concept of mailbox in IPC. What are functions associated of mailbox in MUCOSII. Explain in detail with associated diagram.

5. Explain with block diagram concept of co-operative scheduling method for RTOs. What are the disadvantages? Explain with example.

6. Draw and explain ARM core data flow model.

7. Draw and explain interfacing of GSM with ARM processor.

8. Interface a stepper motor with LPC2148 for the following specifications

   i) The motor is connected to port pins p0.4, p0.5, p0.6 and p0.7

   ii) Rotate motor in clockwise direction.

   Draw a neat circuit diagram and write an embedded C program.

9. What are the states of tasks? Draw and explain the characteristics of each task state. Explain with block diagram task control block.

10. Explain concept of round robin time slicing scheduling for RTOS.

11. Write an ARM ASM code to find largest number from series of 16 bit numbers.

12. Explain hardware and software architecture of embedded system.

13. Draw and explain interfacing of 16X2 LCD with LPC2148 for following specifications:

   i) Use P0.5 as RS and En respectively (Control bus).

   ii) Use P1.16 to P1.23 as data bus (D0-D7).

Write an embedded C program to display “Welcome”.

14.Explain with block diagram micro c/osII preemptive task scheduling method.

Explain functions associated with critical section.

15. What specialties of the Embedded systems should be considered by developer while designing it? Elaborate them.

16. Illustrate the functioning of data flow model of ARM7TDMI core.

17. Describe various design metrics to be considered for designing Embedded System.

18. Write note on CPSR register with significance of each field with bit format.

19. How to select development technology for embedded product based on NRE Cost & Unit cost?

20. Explain any three data processing instructions which includes Barrel shifter operation.

21. Write an embedded C program to interface 8 LEDs from pin number P0.18 to P0.25of LPC2148. Draw circuit diagram for the same.

22. Draw & Explain block diagram of ARM7TDMI core Architecture.

23. Write an embedded C program to interface relay at pin number P0.18 of LPC2148. Draw circuit diagram for the same.

24. Describe ARM processor exceptions with associated mode and exception handling.

25. Write a program to interface Stepper Motor at pin numbers P1.16 to P1.19 of LPC2148. Draw the circuit diagram for the same.

BTech. (Computer Science & Engineering) Part-II Examination 2022

Semester -VIII

Subject- Deep Learning

Question bank

Question No.	Questions	Marks
1	Define Machine Learning. state different types of algorithms	4
2	Write differences between LOOCV and K fold cross validation	4
3	How to make machine learning model generalized	4
4	Explain under fitting and overfitting	4
5	Assume we have two variables, P and Q and we wish to find their relation. A line of equation tell us that P = mQ+c . Suppose the samples of the variables P and Q are available to us. Is it possible to apply linear regression to this data to estimate the values of *m* and *c*? justify your answers	4
6	What is regularization. explain its different method	4
7	Explain Linear perceptron algorithm	6
8	Define : i) Bias ii) Variance iii) Loss function	6
9	Assume a simple deep learning model with 3 neurons and inputs= 1,2,3,4,5. The weights to the input neurons are 2,3 and 4 respectively. Assume the activation function is a linear constant value of 2. calculate the output?	4
10	Describe dimensionality Reduction	4
11	Discuss different types of hyper parameter	4
12	Enlist the different platform for deep learning	4
13	Write uses of different activation function	4
14	Write differences between ANN and DNN	4
15	Explain gradient based learning	6
16	Define i) Early stopping ii) Dropout iii) Error function	6
1	Explain architectural design	4
18	Explain optimization methods	4
19	Explain deep feed forward network	4
20	Enlist different deep learning software libraries	4
21	Write differences between Relu and sigmoid function	4

22	Explain different convolutional Neural network operations	6
23	Explain VGGNet, Lenet	6
24	What is RNN, Explain its working in details	6
25	Write a short note on RNN Topologies	6
26	What is drawback of RNN. How t is overcome by LSTM	6
27	Explain Bidirectional LSTMs	6
28	Explain Bidirectional RNNs	6
29	What is pooling. explain its types	6
30	Write a short note on ImageNet	4
31	Explain case study- Handwritten digit recognition using deep learning	6
32	Explain auto encode in details	6
33	What are the different types of auto encoder explain it in details	6
34	Explain the use of auto encoder in dimensionality reduction & classification	6
35	Explain RMS Prop Deep Learning Optimizer	6
36	Explain SGD optimizer for CNNs	6
37	Write a short note on a. stochastics auto encoder b. denoising auto encoder	4
38	Write different applications of auto encoder	4
39	Explain Deep Architectures of computer Vision	6
40	Define Transfer Learning. Explain in detail	6
41	Explain Metric Learning	4
42	Explain RCNNs with Keras	4
43	Explain Siamese Networks	4

Subject: Information & Cyber Security
Computer Science& Engineering
Class B.Tech Sem VIII [CBCS Pattern]

Question Bank

Section I

1. What is the difference between passive and active security threats?

2. List and briefly define categories of passive and active security attacks.

3. Explain Symmetric Cipher Model
4. Explain Public key Cryptosystem Model
5. Explain any two Block cipher modes of operation
6. Perform encryption and decryption using RSA for p = 7, q=13; e= 5 and M=8
7. Explain Digital Signature Standard
8. Explain DES
9. Encrypt message “The enemy must be stopped at all costs. Do whatever is necessary “ using Playfair technique where the key is “MONARCHY”
10. Explain Hill Cipher with Example
11. Elaborate Digital Signature
12. Explain Message Authentication Code
13. List and briefly define categories of security services.
14. List and briefly define categories of security mechanisms
15. What are Classical Encryption Techniques
16. Explain Hash Requirements
17. Define Security ,Services and Mechanism
18. Explain Rotor Machines
19. Explain RSA algorithm
20. Explain Diffie Hellman Key exchange
21. Encrypt the plaintext message "short example" using the keyword hill and a 2 x 2 matrix
22. Explain One Time pad method with example
23. Users A and B use the Diffie-Hellman key exchange technique with a common prime q = 11 and a primitive root $\alpha = 2$.
    a. If user A has private key X A = 5, what is A's public key Y A?
    b. If user B has private key X B = 12, what is B's public key Y B?

24. Difference Between Symmetric and Asymmetric Cryptosystem
25. Explain Basic Network Security Model

Section II

1. What is Blockchain
2. How Blockchain Technology works?
3. Benefits of Blockchain Technology:
4. What are the advantage of blockchain over conventional distributed database,
5. What are the features provided by Blockchain
6. What is the Consensus mechanism in Blockchain?
7. Explain the difference between Proof-of-Work and Proof-of-Stake.
8. Explain Blockchain Network,
9. Explain Mining
10. What does mining difficulty means?
11. Explain Wallet - Blocks in bitcoin
12. Explain structure Merkley Tree
13. How does bitcoin transaction work
14. Explain anonymity in bitcoin
15. What is forks in bitcoin
16. What are mathematical analysis of properties of Bitcoin
17. Define block chain? And list some difference between Public and Private blockchain.
18. What are Cyber Security Standards? List different Cyber Security Standards and Explain any one in brief.
19. What are different types of internet forensic? Why Internet forensic has become so prevalent?
20. How did forensic happen? How can this be prevented from happening again in the future?
21. Explain IP Security Architecture
22. Draw and explain Authentication Header
23. Elaborate Secure Electronic Transaction
24. Explain Pretty Good Privacy ?
25. What are the advantages of S/MIME?

Subject: Information & Cyber Security

Class B.Tech Sem VIII
Question Bank

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DEPARTMENT OF CIVIL ENGINEERING

B.Tech-IV Year [VIII-Semester]

CV-421: SURFACE HYDROLOGY QUESTION BANK

Unit No. 1

1. Describe the different methods of recording of rainfall.
2. Explain the different methods of determining the average rainfall over a catchment due to a storm. Discuss the relative merits and demerits of these methods.
3. Describe the salient characteristics of precipitation on India.
4. What is meant by Probable Maximum Precipation [PMP] over a basin? Explain how PMP is estimated.
5. Explain briefly the following relationships relating to the precipitation over a basin:
    a) Depth-Area Relationship
    b) Maximum Depth-Area-Duration Curves
    c) Intensity Duration Frequency Relationship
6. A catchment area has a seven raingauge stations. In a year the annual rainfall recorded by the gauges are as follows:

Station	P	Q	R	S	T	U	V
Rainfall (cm)	130.0	142.1	118.2	108.5	165.2	102.1	146.9

   For a 5% error in the estimation of the mean rainfall, calculate the minimum number of additional stations required to be established in the catchment.
7. The normal annual rainfall at stations A, B, C, and D in a basin are 80.97, 67.59, 76.28 and 92.01 cm respectively. In the year 1975, the station D, was inoperative and the station A, B, and C recorded annual precipitations of 91.11, 72.23, and 79.89 cm respectively. Estimate the rainfall at station D in that year.
8. The isohyets due to a storm in a catchment were drawn and the area of the catchment bounded by isohyets are tabulated as below:-

Isohyets (cm)	**Area (km^2)**
Station-12.0	30
12.0-10.0	140
10.0-8.0	80
8.0-6.0	180
6.0-4.0	20

   Estimate the mean precipitation due to the storm.

DEPARTMENT OF CIVIL ENGINEERING

B.Tech-IV Year [VIII-Semester]

CV-421: SURFACE HYDROLOGY QUESTION BANK

Unit No. 2

1. Suggest suitable probability functions, with reasons, to model the following hydrologic variables: Annual runoff, Annual peak flood, and Monthly runoff.
2. Differentiate between continuous and discrete probability distribution functions.
3. Define Correlation and its types along with graphical representation.
4. Analysis of data on maximum one-day rainfall depth at Madras indicated that a depth of 280 mm had a return period of 50 years. Determine the probability of a one-day rainfall depth equal to or greater than 280 mm at Madras occurring (a) Once in 20 successive years, (b) Two times in 15 successive years, and (c) At least once in 20 successive years.
5. The annual rainfall is modelled by normal distribution with mean and standard deviation of 5000 and 1000 cumecs respectively. Find the probability of (i) annual runoff in that area in any year is more than 6500, (ii) between 3800 and 5800.
6. The concurrent average yearly rainfall over a basin and corresponding yearly runoff, both expressed in cm, for a period of 17 years are given below. Establish the dependence between yearly rainfall and yearly runoff by computing the coefficient of correlation between them. Also, compute the rank correlation coefficient for the rainfall runoff data.

Year	1	2	3	4	5	6	7	8	9	10
Rainfall	113	128	127	104	108	115	167	154	99	119
Runoff	74	104	96	61	59	82	109	102	57	78
Year	11	12	13	14	15	16	17			
Rainfall	152	137	165	151	160	130	149			
Runoff	109	96	124	103	134	87	106			

7. Develop a regression equation of the form $Q = aG^b$ between the discharge in the river Q and the corresponding stage G using the data given below:

$\boldsymbol{Q\ (m^3/s)}$	1688	1470	1589	1481	1535	1419	1625	1317	1232
$\boldsymbol{G\ (m)}$	4.72	4.30	4.54	4.31	4.30	4.11	4.43	3.95	3.84
$\boldsymbol{Q\ (m^3/s)}$	1178	1226	1249	1267	640	578	1093	1053	1028
$\boldsymbol{G\ (m)}$	3.72	3.80	3.83	3.86	2.69	2.53	3.57	3.47	3.44
$\boldsymbol{Q\ (m^3/s)}$	875	968	937	818	731	640	515		
$\boldsymbol{G\ (m)}$	3.14	3.32	3.26	3.07	2.89	2.68	2.37		

DEPARTMENT OF CIVIL ENGINEERING

B.Tech-IV Year [VIII-Semester]

CV-421: SURFACE HYDROLOGY QUESTION BANK

Unit No. 3

1. List the factors affecting the seasonal and annual runoff of a catchment. Describe each in detail.
2. Describe briefly the SCS-CN method of estimation yield of a catchment through use of daily rainfall record.
3. What is watershed simulation? Explain briefly the various stages in the simulation study.
4. Define φ-index? Discuss its significance in runoff determination.
5. What is sequent peak algorithm? Discuss the procedure involved in analysis of sequent peak along with suitable sketches.
6. The average monthly flows into a reservoir in a period of two consecutively dry years 1981-82 and 1982-83 is given below:

Month	**Mean monthly flow** (m^3/s)	**Month**	**Mean monthly flow** (m^3/s)
1981-June	20	1982-June	15
July	60	July	50
Aug	200	Aug	150
Sep	300	Sep	200
Oct	200	Oct	80
Nov	150	Nov	50
Dec	100	Dec	110
1982-Jan	80	1983-Jan	100
Feb	60	Feb	60
Mar	40	Mar	45
Apr	30	Apr	35
May	25	May	30

   If a uniform discharge of 90 m^3/s is desired from this reservoir calculate the minimum storage capacity required.
7. A small watershed is *250 ha* in size has *group C* soil. The land cover can be classified as *30%* open forest and *70%* poor quality pasture. Assuming AMC at average condition and the soil to be black cotton soil, estimate the direct runoff volume due to rainfall of *75 mm* in one day. Take CN for open forest and Pasture as 60 and 86 respectively.

8. Annual rainfall and runoff values (in cm) of a catchment spanning over a period of 21 years are given below. Analyse the data to
    a. Estimate the 75% and 50% of dependable yield of the catchment and
    b. To develop a linear annual runoff volume for a given annual value.

Year	Annual Rainfall (cm)	Annual Runoff (cm)	Year	Annual Rainfall (cm)	Annual Runoff (cm)
1975	118	54	1986	75	17
1976	98	45	1987	107	32
1977	112	51	1988	75	15
1978	97	41	1989	93	28
1979	84	21	1990	129	48
1980	91	32	1991	153	76
1981	138	66	1992	92	27
1982	89	25	1993	84	18
1983	104	42	1994	121	52
1984	80	11	1995	95	26
1985	97	32			

9. A storm with 10 cm of precipitation produced a direct runoff of 5.8 cm. The duration of the rainfall was 16 hours and its distribution is given as below. Estimate the φ-index of the storm.

Time from start (h)	0	2	4	6	8	10	12	14	16
Cumulative rainfall (cm)	0	0.4	1.3	2.8	5.1	6.9	8.5	9.5	10.0

DEPARTMENT OF CIVIL ENGINEERING

B.Tech-IV Year [VIII-Semester]

CV-421: SURFACE HYDROLOGY QUESTION BANK

Unit No. 4

1. List out the factors affecting a flood hydrograph. Discuss the role of these factors.
2. What is unit hydrograph? List the assumptions involved in the unit hydrograph theory.
3. Explain the term Rainfall Excess (ER). How is ERH of a storm obtained?
4. Distinguish between:
    a) Hyetograph and Hydrograph
    b) D-h UH and IUH
5. What is an IUH? What are the charecteristics of IUH?
6. Charecteristics of two catchments M and N measured from a map are given below:

Item	Catchment M	Catchment N
L_{ca}	$76\ km$	$52\ km$
L	$148\ km$	$106\ km$
$Area$	$2718\ km^2$	$1400\ km^2$

7. Given the ordinates of a 4-h unit hydrograph as below derive the ordinates of a 12-h for the same catchment.

Time (h)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinate of 4-h UH (m^3/s)	0	20	80	130	150	130	90	52	27	15	5	0

8. A 2-h unit hydrograph in a rather steep catchment is given below:

Time (h)	0	2	4	6	8	10	12
Ordinate of 4-h UH (m^3/s)	0	0.54	1.75	1.27	0.58	0.25	0

   Compute the 1-h unit hydrograph for the catchment.
9. Develop a 30 minute SCS triangular unit hydrograph for a watershed of area 550 ha and time of concentration of 50 minutes.
10. The coordinates of the IUH of a catchment are given below. Derive the direct runoff hydrograph (DRH) for this catchment due to a storm of duration 4 hours and having a rainfall excess of 5 cm.

Time (h)	0	1	2	3	4	5	6	7	8	9	10	11	12
IUH ordinate $u(t)$ (m^3/s)	0	8	35	50	47	40	31	23	15	10	6	3	0

DEPARTMENT OF CIVIL ENGINEERING

B.Tech-IV Year [VIII-Semester]

CV-421: SURFACE HYDROLOGY QUESTION BANK

Unit No. 5

1. Explain briefly about following terms:
   a) Design flood
   b) Standard Project Flood
   c) Probable Maximum Flood
   d) Risk
   e) Reliability
2. For a river, the estimated flood peaks by using log-normal distribution are as follows:

Return Period T (in years)	**Peak Flood (m^3/s)**
50	450
100	600

   What flood discharge in this river will have a return period of 1000 years?
3. Distinguish between:
   a) Hydraulic and Hydrologic method of flood routing
   b) Storage routing and Channel routing
4. Describe Muskingum method of routing an hydrograph through a channel reach. How the values of K and x for a stream are known?
5. Differentiate between Modified Pul's Method and Goodrich Method.
6. A reservoir has the following elevation, discharge and storage relationships:

Elevation (m)	**Storage (MCM)**	**Outflow discharge (m^3/s)**
100.00	3.350	0
100.50	3.472	10
101.00	3.880	26
101.50	4.383	46
102.00	4.882	72
102.50	5.370	100
102.75	5.527	116
103.00	5.856	130

   When the reservoir level was at 100.50 m, the following flood hydrograph entered the reservoir.

Time (h)	0	4	8	12	16	20	24	28	32	36	40	44
Discharge (m^3/s)	0	20	80	130	150	130	90	52	27	15	5	0

Route the flood and obtain:

i. The outflow hydrograph and

ii. The reservoir elevation vs time curve during the passage of flood wave.

7. Route the following flood hydrograph through a river reach for which $K = 12.0\ h$ and $x = 0.20$. At the start of the inflow flood, the outflow discharge is $10\ m^3/s$.
8. Write a shrot note on flood control.

DEPARTMENT OF CIVIL ENGINEERING

B.Tech-IV Year [VIII-Semester]

CV-421: SURFACE HYDROLOGY QUESTION BANK

Unit No. 6

1. Discuss in detail about causes and effects of urban floods.
2. What is flash flood? How and where it occurs?
3. Design the most efficient trapezoidal section for the following design parameters; Discharge (Q) $= 20\ m^3/s$, Bed slope (S) = less than 0.0003, Manning (n) = 0.013, Depth of flow (y) = Less than 3.0 m.
4. An open triangular channel of V shaped with each side inclined at 45 to vertical. It carries a discharge of 40 LPS. When the depth of flow at the centre is 225 mm. Calculate the slope of the channel.
5. Find the most efficient section of rectangular channel to carry 300 lps when the bed slope is 1 in 1000. Take Manning's coefficient 'N' as 0.013.
6. A 225 mm dia storm water drain is to discharge of 0.005 cumec at a required gradient of 1 in 1500. Find out the depth and velocity of flow in storm drain. Assume Manning's coefficient 'N' as 0.013.
7. Discuss any two the following in detail:
    i. Water Sensitive Urban Design (WSUD)
    ii. Low Impact Development (LID)
    iii. Sustainable Urban Drainage System (SUDS)
    iv. Best Management Practices (BMPs)

Computer Science and Engineering

Subject: Management Information Systems

Class: B.Tech(CSE) (CBCS)

Sem-VIII

Section-I

1) Why information systems are so essential in business today?

2)What is MIS ? Identify the nature of impact of MIS on people, organization and the management ?

3) What is MIS ? How is it different from TPS and DSS?

4) Describe the information systems supporting the major business functions: sales and marketing, , finance and accounting, and human resources.

5) What is Enterprise system? How does it work? Explain e-business enterprise with e-commerce, e-communication and e-collaboration.

6) Describe The Role of Information Systems in Business Today.

7) What is new in information system?

8) Write note on : Systems for collaboration and social business.

9) What are the different tools and technologies for collaboration and social business?

10) Describe Organizations and it's features.

11) How Information Systems Impact on Organizations?

12) What are the challenges posed by strategic information systems and how should they be addressed?

13) Which Challenges posed by strategic information systems?

14) How are information systems transforming business, and why are they essential for running and managing a business today?

15) How do Porter's competitive forces model, the value chain model, synergies, core competencies, and network economics help companies develop competitive strategies using information systems?

16) What ethical, social, and political issues are raised by information systems? What specific principles for conduct can be used to guide ethical decisions?

17)Why do contemporary information systems technology and the Internet pose challenges to the protection of individual privacy and intellectual property?

18)How have information systems affected laws for establishing accountability, liability,

and the quality of everyday life?

Section-II

19)What is IT infrastructure and what are the stages and drivers of IT infrastructure evolution?

20)What are the components of IT infrastructure?

21)What are the current trends in computer hardware platforms?

22) What are the current trends in computer software platforms?

23) What are the challenges of managing IT infrastructure and management solutions?

24) What are the problems of managing data resources in a traditional file environment?

25)What are the major capabilities of database management systems (DBMS) and why is a relational DBMS so powerful?

26)What are the principal tools and technologies for accessing information from databases to improve business performance and decision making?

27)Why are information policy, data administration, and data quality assurance essential for managing the firm's data resources?

28)What are the principal components of telecommunications networks and key networking technologies?

29) What are the different types of networks?

30) How do the Internet and Internet technology work and how do they support communication and e-business?

31)What are the principal technologies and standards for wireless networking, communication, and Internet access?

32) Why are information systems vulnerable to destruction, error, and abuse?

33) What is the business value of security and control?

34) What are the components of an organizational framework for security and control?

35) What are the most important tools and technologies for safeguarding information resources?

36) Describe Information Systems Controls.

37) Describe auditing IT Security with suitable example.

38)How do supply chain management systems coordinate planning, production, and logistics with suppliers?

39) How do customer relationship management systems help firms achieve customer intimacy?

40) What are the unique features of e-commerce, digital markets, and digital goods?

41)What are the principal e-commerce business and revenue models?

42) How has e-commerce transformed marketing?

43) How has e-commerce affected business-to-business transactions?

44) What is the role of m-commerce in business and what are the most important m-commerce applications?

45) What issues must be addressed when building an e-commerce presence?

46) Describe denial of service attacks,, E-mail monitoring in security management of information technology.

47) What are the different types of E-commerce?

48) Write note on : Systems for collaboration and social business.

49) Describe business Processes and information systems.

50) Describe fault tolerant systems, and disaster recovery in detail.

EXAMINATION- S. Y. B. Tech (CSE) wef.2019

SUB-DISCRETE MATHEMATICAL STRUCTURE

QUESTION BANK

1. Define Power set. Given S= $\{a_1, a_2, a_3, \ldots\ldots, a_8\}$.what subsets are represented by $B_{19,}$ and B_{124}

2. Given a set X= {1, 3, 6,12, 24, 36} and partially ordered relation on X, which satisfy divides condition draw the Hasse diagram of POSET. And indicate a set is totally ordered or not

3. Define monoid and explain the homomorphism of monoid.

4. Define the following and give example of each.

   a. Ordered pair and order n- tuple b. POSET

5. Explain the procedure to find relation matrix. Let A= {1, 2, 3…….10} and relation R on set A is R = {<x, 2x>| x € A} Obtain the relation matrix and graph of relation.

6. Define relation and explain the properties of relation with example.

7. Define Cartesian product? Let A= {1, 2, 3}, B= {α, β}, find AXB, BXA and (AXB) ∩ (BXA)

8. Let Z be a set of integers and R be relation called "Congruence modulo 3" defined by R= {<x, y>| x € Z and y € Z and (x-y) is divisible by 3}, determine Relation and equivalence classes generated by elements of Z.

9. List the properties of algebraic system < I, +, *> where I is the set of integers with addition and multiplication operation

10. Define function and Explain types of function with example.

11. Define monoid and explain the homomorphism of monoid.

12. What is a Inverse function?

13. f(x)=x+5, g(x)=x-3, h(x)=4x for x € R where R is the set of Real No. Find g o f,

    f o (h o g), h o h , g o g.

14. Explain following with example a] Sub Semigroup b] Sub monoid c]

15. Define function? Let X= {1, 2, 3, 4} determine the function f: X→X such that f≠ Ix and is one to one onto find f^2=f o f, f^3=$f^2$of, f^{-1}

16. Let Z_4 be the set of equivalence classes generated so that Z_4= {[0], [1], [2], [3]}. Let $+_4$ on Z_4 is given by [i] $+_4$ [j]=[(i + j) mod 4] Determine Algebraic System and list out applicable properties on algebraic system.

17. Define & Explain Duality Law with Example

18. Define an index set. Given S= $\{a_1, a_2, a_3, \ldots\ldots, a_8\}$.what subsets are represented by B_{47} and B_{120}

19 Define the following and give example of each. a. Ordered pair and order n- tuple b. proposition

20 What is a Relation? Explain its properties?

21 Given a set X={2, 3, 4, 5, 6, 7, 8} then divides is a partially ordered relation on X draw the Hasse diagram of POSET <X, | > where | means divides.

22 Let f: R->R be given by f(x)=x3-2 find f-1. Where R is Real no. set.

23 Obtain PCNF and PDNF of the following without constructing table

a. $(\neg p \rightarrow q) \wedge (q \leftrightarrow p)$ b. $(p \rightarrow (q \wedge r)) \wedge (\neg p \rightarrow (\neg q \wedge \neg r))$

24. List all possible function from X={a, b, c} to Y={0, 1}indicate in each case whether function is one to one ,is onto, is one to one onto.

25. What is the difference between composition of relation & composition of function

26. Define algebraic system and state the properties.

27. Let S= {a, b, c} then find P(S) (power set of S) and draw the hasse diagram for the POSET<P(S), ≤ >.

28. Define the Homomorphism & its types with respect to Semigroup

29. Write a short note on polish expression and their compilation

30. List the properties of algebraic system < I, +, *> where I is the set of integers with addition and multiplication operation.

31. Define set & explain operation of the set with example

32. Define the term LUB & GLB with the help of example.

33. Explain Group as an algebraic system and define permutation group in detail

34. Show that in group <G, *> if for every a, b € G, $(a * b)^2 = a^2 * b^2$ must be abelian group

35. Composition table for <G, * > and < S, ◇ > are given below show that they are groups and are Isomorphic

*	p1	p2	p3	p4
p1	p1	p2	p3	p4
p2	p2	p1	p4	p3
p3	p3	p4	p1	p2
p4	p4	p3	p2	p1

◇	q1	q2	q3	q4
q1	q3	q4	q1	q2
q2	q4	q3	q2	q1
q3	q1	q2	q3	q4
q4	q2	q1	q4	q3

Faculty of Science & Technology -2022
Final Year B. Tech. [Information Technology] PART-II
ELECETIVE-IV [Cloud Computing]
Question Bank

1. Illustrate the history of Cloud Computing? Also differentiate between Traditional vs. Cloud Computing.
2. Why to choose Cloud Computing? State and explain the benefits of cloud computing?
3. Explain in details all the Cloud service models (IaaS, PaaS & SaaS).
4. Draw& explain Cloud deployment models (Public, Private, Hybrid and Community Cloud)?
5. State and justify the benefits and Challenges of Cloud Computing?
6. Draw and explain the role of virtualization in Cloud Computing?
7. Define Private Cloud also explain the Characteristics of Private Cloud?
8. State & explain the Private Cloud deployment models?
9. Draw & explain in detail the architecture and its compute, storage, networking, and IAM services of CloudStack?
10. Draw & explain in detail the architecture and its compute, storage, networking, and IAM services of OpenStack?
11. OpenStack: architecture and its compute, storage, networking, and IAM services.
12. Extend in detail the designing elastic, highly available, and resilient infrastructure using OpenStack?
13. Write short note on CloudStack for varied application scenarios.
14. Identify & explain the financial and technological implications of running an application on private cloud.
15. State & explain the Public Cloud deployment models?
16. When to opt for Public Cloud also explain the Public Cloud Service Models?
17. State & justify the services of Public Cloud Vendors?
18. Explain in detail the basic compute, storage, networking and IAM services of AWS?
19. Illustrate in detail the Microsoft Azure and Google Cloud platform?
20. Illustrate in detail the Google Cloud platform?
21. Justify in detail with example Designing elastic, highly available, and resilient infrastructure for varied application scenarios on AWS?
22. Justify in detail with example Designing elastic, highly available, and resilient infrastructure for varied application scenarios on Microsoft Azure?

23. Justify in detail with example Designing elastic, highly available, and resilient infrastructure for varied application scenarios on Google Cloud platform?
24. State and explain all the Financial and technological implications of running an application on public cloud.
25. Explain the security concerns in Traditional IT?
26. Illustrate the challenges in Cloud Computing in terms of Application Security?
27. Illustrate the challenges in Cloud Computing in terms of Server Security?
28. Illustrate the challenges in Cloud Computing in terms of Network Security?
29. Draw and illustrate the Security reference model for cloud computing?
30. Write short note on
    a. Abuse and Nefarious Use of Cloud Computing
    b. Insecure Interfaces and APIs
    c. Malicious Insiders
    d. Shared Technology Issues
    e. Data Loss or Leakage
    f. Account or Service Hijacking
    g. Unknown Risk Profile
31. Draw & explain with example the security model between vendor and customer in IAAS?
32. Draw & explain with example the security model between vendor and customer in PAAS?
33. Draw & explain with example the security model between vendor and customer in SAAS?
34. Identify the reason behind Why Cloud for business perspective?
35. State & explain the Establishing your Cloud Vision with example?
36. Explain with example buying Cloud Services?
37. Illustrate with example understanding Cloud Risk?
38. Extend in detail the building ROI from Cloud Computing?
39. State & justify the Challenge and Cloud Computing in Use?
40. When and not to migrate to Cloud explain the detailed process?
41. State & justify the migration paths for cloud?
42. What is the selection criteria for cloud deployment explain the procedure with example?
43. State and explain the issues and risks in migrating to cloud computing.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Final Year B.Tech. (Electronics & Telecommunication Engineering) (Part –II)
CBCS Pattern

Question Bank for Artificial Intelligence and Applications

Q1 Give a brief Introduction to Artificial Intelligence?

Q2 Explain Intelligent Agent with their types?

Q3 Explain Solving Problem by Searching?

Q4 Explain Alpha Beta Pruning?

Q5 Explain the basics of Knowledge Representation and Reasoning?

Q6 Explain Event calculus and Situation Calculus?

Q7 Explain Heuristic Technique?

Q8 What are the stochastic Search Methods?

Q9 Explain Minimax Algorithm?

Q10 Explain Description Logic?

Q11Explain Reasoning with default?

Q12 Explain Reasoning about knowledge?

Q13What is constraint Satisfaction Problems?

Q14 Explain First Order Logic (FOL)?

Q15What is Formal Grammar, explain it with example?

Q16What is syntactic analysis?

Q17What is semantic interpretation?

Q18Explain Ambiguity and Disambiguation with example?

Q19What is discourse Understanding?

Q20Explain Grammar Induction?

Q21What are probabilistic language models and what can language model do?

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Final Year B.Tech. (Electronics & Telecommunication Engineering) (Part –II)
CBCS Pattern

Question Bank for Artificial Intelligence and Applications

Q22. Explain Industrial Manipulators with Types and Applications?

Q23What is Robotic Paradigm?

Q24 Explain making machine intelligent?

Q25Explain space robotics with AI approach?

Q26.Give Introduction to Deep Learning Networks?

Q27.Differentiate Deep Learning versus machine learning?

Q28 Explain CNN with Example and working of pooling layer?

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Fourth Year B.Tech. (Electronics & Telecommunication Engg.) (Part –II)
CBCS Pattern

Question Bank for Internet of Things

Section- I

Q2) Solve any four of the following: (4*4=16 M)

1) Give Introduction of IoT?
2) Explain different components of IoT?
3) Explain IOT Architecture?
4) Explain applications of IoT in various domain?
5) Describe embedded systems with different types.
6) What is the Role of Embedded system in IoT?
7) Explain Microcontroller based embedded system?
8) Explain Linux based embedded system?
9) Explain various IDE's for embedded development?
10) State ARM cortex M-3 Applications
11) Draw and explain the data flow model of ARM
12) State different applications of IoT in various domain..
13) Write a note on Internet of Things. Give some examples.
14) Draw and explain basic structure of embedded system software.
15) State and explain the Cortex series (A, R, M, Series) classification.
16) State and explain any two instructions of following- a) Data processing b) Arithmetic
17) State low power features of Cortex M3 Processor and explain sleep-on-exit feature in detail with flowchart.
18) State and explain various types of Embedded Systems.
19) Draw block diagram od API. Describe each block of API in detail.
20) Describe various exceptions of Cortex M3.

Q 3) Solve any two of the following: (2*6=12 M)

1) What are Hardware and Software components of embedded system?
2) Describe Cortex M-3 Architeture with block diagram .
3) Explain ARM cortex M3 Memory Mapping structure in detail.
4) Explain Register Mapping of Cortex M-3 with function of each register?
5) Draw format of Program Status Register in Cortex M-3 State function of each flag used in it.
6) Describe various Operating Modes of Cortex M-3 with State diagram.
7) Discuss LDR and STR data moving instructions in details with examples.
8) What is MQTT protocol? List down the requirements provided by MQTT protocol.
9) With block diagram explain Weather Monitoring System using IoT.
10) Draw format of Program Status Register in ARM Cortex M3.
State function of each bit from this register.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Fourth Year B.Tech. (Electronics & Telecommunication Engg.) (Part –II)
CBCS Pattern

Question Bank for Internet of Things

Section-II

Q4) Solve any four of the following: (4*4=16 M)

1) Explain the concept of Zigbee.
2) Explain the concept of WiFi.
3) State and explain the characteristics of Bluetooth low energy technology.
4) State and explain the characteristics of Zigbee.
5) Write applications of Zigbee.
6) Give the advantages & limitations of Bluetooth low energy technology.
7) Give the advantages & limitations of Zigbee.
8) Give the advantages & limitations of RFID.
9) Compare Bluetooth low energy technology and WiFi.
10) Write in details the concept of APIs
11) Compare various IoT cloud platform.
12) Summaries performance metrics for cloud platforms in IoT.
13) Discuss the working principle of near-field and far-field RFID tags with neat, diagrams.
14) With an example discuss the CoAP NON and CON messaging in detail
15) What is a Cloud? Discuss SaaS services supported in Cloud.
16) Programmer want to write a code in C for embedded platform, suggest him an IDE with justification and block diagram.
17) Compare contrast between BLE & WiFi
18) Draw and explain BLE with its protocol stack & Packet structure.
19) State characteristics of Zigbee
20) Explain deferent COAP transactions and Methods along with message format.

Q 5) Solve any two of the following: (2*6=12 M)

1) Explain the concept of Bluetooth low energy technology
2) Explain the concept of RFID.
3) Draw and explain architecture of Zigbee.
4) Compare Zigbee and WiFi
5) Justify the costing structure of cloud for IoT
6) Design an cloud based embedded system to read environmental temperature and write a program to put the data on freely available cloud (Use appropriate sensors and processor).
7) Explain IOT Cloud Architecture
8) List down different messages used in CoAP and elaborate with neat diagram a CoAP message format
9) Elaborate with neat diagram Zigbee packet format and addressing
10) Discuss with neat diagram the MQTT publish-subscribe model and topology.

PAH Solapur University, Solapur
Final Year BTech (Electronics Engineering)
Advanced Communication Engineering n
Sample Question Bank

Section –I

Q.2- Questions for 6 Marks

1. Derive scattering matrix for E-H plane Tee junction. Discuss different cases.
2. Derive scattering matrix for directional coupler.
3. Derive scattering matrix for E plane Tee junction. Discuss different cases.
4. Derive scattering matrix for H plane Tee junction. Discuss different cases.
5. Describe the construction and operation of isolator and circulator.
6. Construct a two cavity klystron amplifier and explain its working.
7. Sketch Apple gate diagram for reflex klystron and explain working.
8. Derive the equation for velocity modulation for two cavity klystron amplifier and explain its working
9. Derive Hull cut off voltage equation for a magnetron.
10. Construct π-Mode Magnetron and RF field and magnetic field effect on electron emitted from cathode. State its performance parameters.
11. With suitable diagram illustrate the operation of TWT tube
12. With suitable diagram illustrate the operation of BWO tube
13. Draw block diagram of Pulse radar system and explain its working Principal.
14. Derive the radar range equation and explain effect of performance factors.
15. Draw block diagram of MTI radar system and explain its working Principal.

Q.3- Questions for 4 Marks

1. Review any five important features of microwave frequency.
2. Classify the microwave bands with respect to its frequency range
3. Review any five important Application of microwave frequency.
4. State the properties of scattering matrix.
5. What is microwave junction Tee? Why it is known as Tee Junction?
6. Sketch E/H/E-H Plane Tee Junction and describe its operation.
7. Sketch directional coupler and describe its operation
8. What are ferrities? Why are these useful in microwaves .Mention their properties?
9. Derive the equations for reflection coefficient and transmission coefficient.
10. Derive the equations for microwave transmission Line.
11. "Conventional devices have limitations at the high microwave frequencies". Justify the statement
12. Describe in detail the principles of the following terms Gunn Effect, high field domain, two valley theory and three valley theory.
13. Show how PIN diode can be used as variable resistance and variable capacitance.
14. With the waveform show how BARATT diode functions in negative resistance region
15. With the help of proper diagram explain working of Tunnel diode.
16. Realize construction and working of IMPATT diode
17. Realize construction and working of TRAPATT diode
18. Realize construction and working of Varactor diode
19. Show how GUNN diode can be used as oscillator at microwave frequency.
20. Explain basic principle of radar system.
21. Derive Doppler frequency in continuous wave radar.
22. Compare CW Doppler radar and FM-CW radar.
23. Explain factors affecting range of radar.
24. Write a note on FM-CW Radar.
25. Write a note on Phased array Radar

Section –II

Q.5- Questions for 6 Marks

1. Realize block diagram of Attitude and Orbit control system (AOCS) and power subsystem
2. Draw the block diagram of earth station and explain in detail.
3. Draw the block diagram of satellite subsystem and briefly describe the function of each subsystem.
4. Realize block diagram of Telemetry Tracking and control subsystem and explain
5. Summarize basic antenna types used for satellite.
6. Discuss on multiple accesses in satellite.
7. What is system noise temperature? How does it affect the C/N and G/T ratio?
8. What are transponders? Explain single and double conversion transponders.
9. Derive the expression for up-link and down link design.
10. Explain working of DBS-TV receiver.
11. Explain the working of VSAT hub master control station
12. Explain construction and working of edge emitting double hertojuncation LED.
13. Explain construction and working of LASER diode.
14. Explain construction and working of Avalanche photo diode
15. Explain stimulated emission and spontaneous emission with the help of two level energy band diagrams

Q.6- Questions for 4 Marks

1. What is meant by geostationary satellite?
2. Explain in detail orbital effects in communication system performance?
3. Explain the terms angle of inclination and angle of elevation with neat diagram.

4. Define the following terms 3axis stabilization and spin
5. Explain in detail launch and launch vehicles.
6. “Satellite can be used in Navigation Service like Globe positioning system” illustrate the statement
7. State Kepler’s Three Laws of planetary motion.
8. State range and application of LEO, MEO and GEO satellites
9. Write a note on satellite solar power system.
10. Explain single and double conversion transponders
11. What are the factor considered for Link Design in satellite
12. Write a note on station Keeping
13. Explain the procedure of locating the satellite in the orbit.
14. Thermal noise in an earth station receiver results in a (C/N)dn ratio of 20 dB A signal is received from a bent pipe transponder with a (C/N)up=20dB. What is the value of overall (C/N)0 at the earth station?
15. Compare Demand assigned multiple accesses and pre assigned multiple accesses.
16. Compare between TDMA, FDMA and DAMA
17. Explain working of GPS system.
18. Explain working of Radio navigation
19. Compare of single mode and multimode in optical fiber
20. Compare step index and graded index in optical fiber
21. Derive numerical aperture for step index fiber.
22. Explain bending losses in optical fiber.
23. Draw the block diagram of optical fiber communication.
24. Draw and explain different types of optical fiber.
25. Write advantages and application of optical fiber communication.

Final Year B.Tech. (Information Technology)
SET A

Subject: Elective V (Information Retrieval)

- **Short Answer Questions**

1. Find Edit Distance between given words.
2. Compare classic text retrieval models.
3. Compare browsing models.
4. Explain how probabilities are calculated in probabilistic model.
5. Explain how weights are calculated in vector model.
6. Explain how queries are expanded.
7. Explain various patterns with examples.
8. Show full evaluation and lazy evaluation for the given documents
9. What are different measures of performance evaluation?
10. How recall and precision are calculated as single value summaries?
11. State advantages and disadvantages of vector model, booelan model and probabilistic model.
12. What are the drawbacks of using precision and recall?
13. Explain precision histogram.
14. Explain Context Queries with examples.
15. Compress given text using word-based model (spaceless words) and Huffman coding
16. Compare data retrieval, text retrieval model and multimedia model.
17. Explain terms intraclustering and interclustering.
18. Explain Lexical analysis and issues related to it.
19. How signature files are constructed and how queries are searched using signature files.
20. Create suffix trie, suffix tree for given strings.
21. Find pattern position in given string using given BM algorithm and show stepwise result.
22. Find pattern position in given string using given KMP algorithm and show stepwise result.
23. Find pattern position in given string using given BDM algorithm and show stepwise result.
24. Find pattern position in given string using given Shift-OR algorithm and show stepwise result.
25. Find pattern position in given string using given Brute Force algorithm and show stepwise result.
26. Find whether string will be accepted given pattern, string and no of errors using dynamic programming.

27. Find whether string will be accepted given pattern, string and no of errors using automata.
28. Explain Pageranking algorithm.
29. Explain different techniques used in crawling.
30. What is metasearch engine with advantages and disadvantages?
31. Explain in detail HITS ranking algorithm.
32. What are the requirements of ideal query?
33. Explain different types of predicates.
34. How multimedia data is internally represented?
35. Explain multimedia query format.
36. Explain different types of predicates with examples.
37. How the degree of relevance of retrieved objects is calculated in multimedia query language?
38. Explain various ranking algorithm.
39. Construct Suffix Automata for given pattern.
40. State the difference between
    a. Text information retrieval and multimedia information retrieval
    b. Conventional data and multimedia data

- **Long answer questions**

1. What is document preprocessing. Explain its various steps.
2. Calculate Precision and Recall and plot a graph.
3. Find Logical View for each document using full text.
4. Define Information retrieval. Explain information retrieval process with neat diagram.
5. Create weight vectors using vector model for given documents and find relevant documents for given query.
6. Create weight vectors using Boolean model for given documents and find relevant documents for given query.
7. Explain MULTOS model in detail with example. How image data is dealt in MULTOS model.
8. Create signature file for given document and search given query using index.
9. Create inverted index for given document and search given query using index.
10. Create suffix tree and trie for given document and search given query using index.
11. Explain feature extraction and Lower-bounding with example.
12. How image analysis is carried out in MULTOS model?
13. How searching and browsing is combined in Webglimpse?
14. Explain GEMINI approach in searching two-dimensional color images.
15. Explain GEMINI approach in searching similar pattern in time series data.

16. Explain various web search engines algorithms with advantages and disadvantages
17. Find pattern position in given string using given sequential algorithm and show stepwise result.
18. Find whether string will be accepted given pattern, string and no of errors using approximate matching algorithm.
19. Why GEMINI approach is preferred? Explain dimensionality curse and cross talk problem with example.
20. Explain the three main aspects required to consider in designing multimedia query language.

Final Year B.Tech. CSE(Part - II) (New) Examination 2021-22
(COMPUTER SCIENCE & ENGINEERING)
MANAGEMENT INFORMATION SYSTEM

Question Bank

Section I

Q. Short Questions

1. What is an information system? How does it work?
2. What's New in Management Information Systems?
3. What are the different characteristics and applications of DSS?
4. What is Collaboration?
5. What are business processes? How are they related to information systems?
6. What is Organizations and explain it's features
7. How do systems serve the different management groups in a business?
9. How MIS supports to the management in the organization?
10. What are the challenges posed by strategic information systems?
11. Explain how to perform a strategic systems analysis.
12. Explain how businesses benefit by using network economics and ecosystems.
13. What ethical, social, and political issues are raised by information systems?
14. Explain how ethical, social, and political issues are connected with example.
15. What specific principles for conduct can be used to guide ethical decisions?
16. List and define the three legal traditions that protect intellectual property
17. Explain how the value chain model can be used to identify opportunities for information systems
18. Explain how the Internet challenges the protection of individual privacy and intellectual property

Q. Write in described format.

1. How are information systems transforming business, and why are they so essential for running and managing a business today?
2.What is the impact of the information systems on organizations?
3. What is role and importance of Management Information System?
4. What are the components in management, organization, and technology of information system?
5. Explain the Tools and technologies for collaboration and social business in Information System?
6. Define Porter's competitive forces model and explain how it works.
7. Write and explain the Business Value Chain Model.
8. Which features of organizations do managers need to know about to build and use information systems successfully?
9. List and describe the five steps in an ethical analysis.
10. Identify and describe six ethical principles.

Section II

Q. Short Questions

1. What are the components of IT infrastructure?
2. What are the challenges of managing IT infrastructure?
3. Define IT infrastructure from both a technology and a services perspective.
4. List the essential characteristics of cloud computing
5. Define Java and HTML5 and explain why they are important.
6. Define and describe web services and the role played by XML.
7. What are the problems of managing data resources in a traditional file environment?
8. Define and explain the significance of entities and attributes
9. Write the Name and briefly describe the capabilities of a DBMS.
10. What are the principal components of telecommunications networks and key networking technologies?
11. Describe the features of a simple network and the network infrastructure for a large company
12. What are the different types of networks?
13. Explain how the Domain Name System (DNS) and IP addressing system work.
14. Define Bluetooth and Wi-Fi.
15. Define DoS attacks
16. Explain the organizational Security Policies.
17. List and describe the unique features of e-commerce.
18. Define a digital market and digital goods and describe their distinguishing features
19. Describe the principal e-commerce business models.
20. What is the role of m-commerce in business.

Q. Write in described format.

1. What is IT infrastructure, and what are the stages and drivers of IT infrastructure evolution?
2. What are the current trends in computer hardware platforms?
3. What are the current computer software platforms and trends?
4. List and describe the problems of the traditional file environment
5. Define and describe the following: web server, application server, multitiered client / server architecture
6. Explain how businesses can benefit from virtualization, green computing, and multicore processors.
7. What are the principal technologies and standards for wireless networking, communication, and Internet access?
8. What are the principal tools and technologies for accessing information from databases to improve business performance and decision making?
9. What is meant by security? Explain the need of security.
10. Describe the different types of location based services and applications of m-commerce.

Final Y. B. Tech (E&TC) Sem-I w.e.f (June 2021)
DBMS QUESTION BANK

1. Define each of the following terms:
   a. Data
   b. Field
   c. Record
   d. File
2. What is data redundancy, and which characteristics of the file system can lead to it?
3. What is a DBMS, and what are its functions?
4. What is the role of a DBMS, and what are its advantages? What are its disadvantages?
5. List four significant differences between a file-processing system and a DBMS.
6. What are the functions of a database administrator?
7. Explain the difference between two-tier and three-tier architectures. Which is better suited for Web applications? Why?
8. List the basic building blocks of Data Model
9. What are mapping cardinalities?
10. Discuss the basic issues in the design of an ER database schema
11. Discuss the different levels of abstractions in DBMS
12. Explain specialization and Generalization
13. Explain different types of attributes
14. Explain the following terms weak entity set, total participation, partial participation and foreign key
15. Explain relational algebra notations for select, project, cartesian product
16. What is relational algebra?
17. List and explain relational algebra operations
18. Explain the basic structure of relational database
19. Explain database schema
20. List and explain the different types of keys with example
21. What are schema diagrams
22. Explain procedural and nonprocedural language
23. Explain basic data types available in SQL
24. List types of SQL commands.
25. Explain basic structure of SQL queries with example
26. Explain the following commands with suitable example
    a. Commit
    b. Grant
    c. Rollback
27. Define SQL DELETE and UPDATE statement
28. Explain DDL, DML, DCL and TCL Statements
29. Explain the following commands. char(n), varchar(n), int, smallint, numeric(p,d), real, float(n)
30. Define join and explain different types of joins in SQL
31. Explain Integrity constraints with example
32. List and explain the different set operations
33. List and explain Aggregate Functions

34. List and explain additional basic operations
35. Explain NULL values
36. Explain Nested Subqueries with example
37. List the commands for modification of database
38. List the different types of normalization
39. What is functional dependency theory?
40. Differentiate between full and Partial functional dependencies
41. Explain Second NF, Boyce-Codd Normal Form, Third Normal Form
42. Explain the good features of relational database design
43. Explain static hashing
44. Explain dynamic hashing
45. Differentiate between static and dynamic hashing
46. Explain Ordered indexing with example
47. Explain hashing with example
48. Discuss in detail B+ tree file organisation
49. Discuss in detail B Tree file organisation
50. Describe in brief the concept of secondary Index
51. Discuss time stamped protocol
52. Discuss ACID properties of a transaction
53. Explain concept of conflict and view serializability
54. Explain deadlock detection mechanism
55. What are properties of transaction
56. Define deadlock with example
57. Explain two phase locking protocol with example
58. Explain different states of transaction with neat diagram
59. Write a short note on serializability
60. How to detect and prevent deadlock state. Explain with example
61. Why we need to do recovery in DBMS
62. Define failure. Explain log-based recovery
63. Explain Shadow Paging
64. List and explain different storage types
65. List the types of failure and algorithms to recover the data from failure

QUESTION BANK
CIVIL ENGINEERING DEPARTMENT
Course-T. Y BTech-Part-I- 2021-22
Semester-I
Subject: Highway & Tunnel Engineering

SECTION-I

1) Explain the camber. What are the objects of camber? Discuss the factors affecting camber.
2) Explain ruling, maximum and exceptional gradients. Specify the values recommended by IRC for plains and hill.
3) Calculate the safe stopping sight distance for design speed of 80kmph for
   (a) two-way traffic on a two-lane road
   (b) two-way traffic on a single plane road.
   Assume coefficient of friction as 0.37 and reaction time of driver as 2.5 seconds.
4) While aligning a highway, it was necessary to provide a horizontal circular curve having radius 300 m. If design speed is 80 kmph, length of wheel base of largest vehicle is 6 m & width of pavement is 10.5 m, calculate-
   i) super-elevation required
   ii) extra widening of pavement
   iii) length of transition curve
5) A two-lane highway has a horizontal curve of radius 200m and total length of the curve is 240m. The distance between the center line of the highway and the center of inner lane is 1.95m at the curve. Determine the setback distance to provide a stopping sight distance for a design speed of 80kmph. Assume all other data.
6) Calculate the safe overtaking sight distance from the following data for one way and two-way traffic
   1. Speed of overtaking vehicle = 96 kmph
   2. Speed of overtaken vehicle = 22 kmph
   3. Reaction time of driver = 2 sec
   4. Rate of acceleration = 2.5 kmph/sec
7) A radius of 250 m has to be provided at a locality due to site restrictions on a National Highway with design speed 100 kmph. Design the super elevation. Should there be any restriction in speed?
8) A two lane national highway passing through a rolling terrain has a horizontal curve of radius 500m. Design the length of transition curve and shift of the curve. Assume Design speed=80kmph, length of wheel base=6m, width of pavement=7m. Rate of introduction of super elevation=1 in 150.
9) Calculate the minimum sight distance required to avoid a head-on collision of two cars approaching from the opposite directions at 90 and 60 kmph. Assume a reaction time of 2.5 seconds, coefficient of friction of 0.7 and a brake efficiency of 50 percent, in either case
10) The speeds of overtaking and overtaken vehicles are 90 kmph and 80 kmph respectively on a two-way traffic road. The average acceleration during overtaking may be assumed as 0.99 m/ sec^2.

Calculate

a) Safe overtaking sight distance

b) The minimum length of overtaking zone

c) Desirable length of overtaking zone

d) Draw neat sketch and show the positions of the sign post.

11) Explain the importance of transition curve and calculate the length of transition curve using the following data: Design speed=80Kmph, Radius of circular curve=250m, pavement width including extra widening=7.8m, allowable rate of superelevation=1 in 150 (pavement is rotated about the inner edge).

12) Briefly explain the engineering surveys needed for locating a new highway.

13) Write a short on importance of a) Camber b) shoulders c) Road Kerbs .

14) Derive the expression for finding the overtaking sight distance on a highway.

15) Calculate the extra widening required for a pavement of width 7m on a horizontal curve of radius 200m if the longest wheel base of vehicle expected on the road is 6.5m. Design speed is 5kmph.

16) A vertical summit curve is formed when an ascending gradient of 1 in 25 meets another ascending gradient of 1 in 100. Find the length of summit curve to provide the required stopping sight distance for a design speed of 80 kmph.

17) A valley curve is formed by a descending gradient of 1 in 40 which meets an ascending gradient of 1 in 30.

a) Design the total length of valley curve if the design speed is 100kmph so as to fulfill both comfort condition and headlight sight distance for night driving after calculating the SSD required.

b) Find the position of the lowest point on the valley curve to locate a culvert.

18) An expressway four lane divided, passing through a flat terrain has a horizontal curve of radius equal to ruling minimum radius and design speed is 100kmph. Assume design coefficient of lateral friction=0.15, length of the vehicle wheel base=6.1m. Calculate the following elements of the curve, a) Ruling minimum radius b) Super elevation c) Extra Widening d) Length of transition curve using IRC equation. Assume Suitable data.

19) Explain the importance of transition curve and calculate the length of transition curve using the following data: Design speed=80Kmph, Radius of circular curve=250m, pavement width including extra widening=7.8m, allowable rate of superelevation=1 in 150 (pavement is rotated about the inner edge).

20) Calculate the extra widening required for a pavement of width 7m on a horizontal curve of radius 200m if the longest wheel base of vehicle expected on the road is 6.5m. Design speed is 5kmph.

21) A vertical summit curve is formed when an ascending gradient of 1 in 25 meets another ascending gradient of 1 in 100. Find the length of summit curve to provide the required stopping sight distance for a design speed of 80 kmph

22) The load-penetration values of CBR tests conducted on two soil specimens of a particular soil are given below. Determine the average CBR value of the soil if 1 division of the load dial represents 2kg load on the calibration chart of proving ring. Plot neat graph.

Penetration of plunger, mm	**Load dial readings, divisions**		**Penetration of plunger, mm**	**Load dial readings, divisions**	
	Specimen no-1	**Specimen no-2**		**Specimen no-1**	**Specimen no-2**
0	0	0	3	37	20
0.5	8	0.5	4	43	30
1	15	1.5	5	48	38
1.5	23	2.5	7.5	57	50
2	29	6	10	63	58
2.5	34	13	12.5	67	63

23) The load-penetration values of CBR tests conducted on two soil specimens of a particular soil are given below. Determine the average CBR value of the soil if 1 division of the load dial represents 2kg load on the calibration chart of proving ring. Plot neat graph.

Penetration of plunger, mm	**Load dial readings, divisions**	**Penetration of plunger, mm**	**Load dial readings, divisions**
	Specimen no-1		**Specimen no-1**
0	0	3	37
0.5	8	4	43
1	15	5	48
1.5	23	7.5	57
2	29	10	63
2.5	34	12.5	67

24) Explain briefly the importance of aggregate impact test, Water absorption and abrasion test with desired values. (Don't write test procedure)

25) A plate load test was conducted on a soaked subgrade during monsoon season using a plate diameter of 30cm. The load values corresponding to the mean settlement dial readings are given below. Determine the modulus of subgrade reaction for the standard plate.

Mean settlement, mm	0.0	0.26	0.52	0.76	1.02	1.26	1.53	1.76
Load Values, kg	0.0	540	1010	1290	1510	1600	1720	1840

26) The specific gravities and weight proportions for aggregate and bitumen are as under for the preparation of Marshall Mix design. The volume and weight of one Marshall specimen was found to be 475 cc and 1100 gm. Assuming absorption of bitumen in aggregate is zero, find V_v, V_b, VMA and VFB;

Item	A_1	A_2	A_3	A_4	B
Wt (gm)	825	1200	325	150	100
Sp. Gr	2.63	2.51	2.46	2.43	1.05

27) Enlist the different methods for material testing, explain the necessity of testing of different material used in flexible pavement

28) Write a detailed note on "Significance of CBR & Plate load test on subgrade soil".

29) List the different tests on road aggregates and explain any one test with neat sketch mentioning desirable values as per IRC.

30) List the different tests on bitumen and explain any one test with neat sketch mentioning desirable values as per IRC.

31) Explain the applications of Geosynthetics in highway construction

SECTION-II

32) Draw a neat cross section of Two-Lane Flexible pavement with paved shoulder in embankment and show the dimensions, component parts. Enumerate the functions of each component of the pavement.

33) C.C. Pavement is constructed using the following data:
   a) Modulus of elasticity 3 x 10^5 kg/cm^2
   b) Poisson's ratio=0.15
   c) Thickness of CC pavement = 20 cm
   d) Modulus of subgrade reaction-6.0kg/cm^3
   e) Wheel load = 6100 kg
   f) Radius of loaded area = 19 cm
   g) Relative stiffness of slab to subgrade*(l)*=70.61cm
   h) Equivalent radius of resisting section(b)=14cm
   i) Calculate stresses at Interior, Edge and corner by Westergaard's method.

34) Define the terms 'Radius of relative stiffness' and Equivalent radius of resisting section'. A rigid pavement 3mx0.2m has modulus of subgrade reaction =8kg/cm^3, Poisson's ratio=0.15, Coefficient of thermal expansion =10x10^{-6}/^{0}C, E=3x10^4 N/mm^2, Bradbury coefficient Cx=0.9, Cy=0.8, the radius of contact between the road and tyre=0.15m, the temperature gradient during night is 15^{0}C (for warping stress at interior and edge).
Determine warping stresses at interior and edge region.

35) Determine the warping stresses at interior, edge and corner of a 25cm thick cement concrete pavement with transverse joints at 5.0m interval and longitudinal joints at 3.6m intervals. The modulus of subgrade reaction K is 6.9kg/cm^3 and radius of loaded area is 15cm. Assume temperature differential during day to be 0.6^{0}C per cm slab thickness (for warping stress at interior and edge) and maximum temperature differential of 0.4^{0}C per cm slab thickness during the night (for warping stress at the corner).
Assume e=10x10^{-6}per ^{0}C, E=3x10^5 kg/cm^2, μ=0.15.
Use Bradbury chart given in **Figure-1**.

36) Calculate the stresses at the interior, edge and corner region of cement concrete pavement using Westergaard's analysis. Use the following data: Wheel Load P=5100kg, Modulus of elasticity of cement concrete E=0.3million kg/cm^{2,} pavement thickness, h=18cm, Poisson's ratio, μ=0.15, Modulus of subgrade reaction, K=3.0kg/cm^3, Radius of contact area, a=15cm.

37) Explain the ESWL concept with graphical method.

38) Explain with neat sketches of different types of joints in CC pavements.

39) Explain the design steps of dowel bar as per IRC guidelines.

40) Design a new flexible pavement as per IRC-37 using the following data;

Input data:

Initial Traffic in each direction on counting year, N = 218 CV/day

1) Construction period since last traffic count, x = 2 Years
2) Design Life of pavement to be considered, n = 15 Years
3) Design CBR of Subgrade soil = 7%
4) Traffic Growth Rate, r = 7.5 %
5) Vehicle Damage Factor as per axle load survey, F = 3.5
6) Lane Distribution factor, D = 0.75
7) Directional Distribution = 1.00

Use-Plate-4 to 6 of IRC-37-2012

41) Explain in detail factors to be considered for the design of flexible pavement.

42) Explain the construction steps for a) WMM road b) Bituminous concrete road and c) Cement Concrete rod

43) List the different types of distresses in flexible pavement and explain anyone.

44) Explain briefly the principle of benefit-cost ratio of economic analysis of highway improvement project.

45) It is proposed to widen a stretch of a single lane road of length 40km to two lanes with earthen shoulders at a total cost of Rs. 125 Lakhs per km and the rate of interest is 10% per year. The annual cost of maintenance of the existing single lane road is Rs. 21000 per km and that of the improved two-lane road is Rs. 75000 per km. The average vehicle operation cost on the existing road is Rs. 4.0 per vehicle-km and that on the widened road is estimated to be Rs. 3.0 per vehicle –km. If present traffic is 6000 motor vehicles per day and by the end of 15 years design period the traffic is estimated to be doubled, determine whether the investment on the improvement of the road is economically viable, during the 15 years period.

46) Compare the annual costs of a 2-lane road for two types of pavement structures:
   i) WBM with thin bituminous surface at total cost of Rs. 108 lakhs per km, life of 5 years, interest at 10%, salvage value of Rs. 10 lakhs after 5 years, annual average maintenance cost of Rs. 0.35 lakhs per km and

ii) Bituminous Macadam Base and bituminous concrete surface, total cost of Rs. 197 Lakhs, life of 15 years, interest at 8%, salvage value of 25 lakhs at the end of 15 years, annual average maintenance cost of Rs. 0.75 lakhs per km

47) Calculate the annual cost of a stretch of highway from the following data

Item	**Total Cos, Rs. In Lakhs**	**Estimated Life, years**	**Rate of Interest, %**
Land	35	100	6
Earth work	40	40	8
Bridges, culverts & Drainage	50	60	8
Pavement	100	15	10
Traffic signs and road appurtenances	15	5	10

The average cost of maintenance of the road is Rs. 1.5 Lakhs per year.

48) Write a short note on a) BOT b) DBFOT system

49) State methods of tunneling in soft rock. Explain with sketch any one method.

50) Write a short on a) Tunnel lining b) Tunnel Ventilation and c) Drainage in tunnel

51) What are the advantages of implementing PPP projects for highway development in India?

52) Describe heading and bench method of tunneling in hard rock with neat sketch.

Punyashlok Ahilyadevi Holkar Solapur University,Solapur
Department Electrical Engineering
Class :- Final Year B. Tech. (EE) Sem-II

Subject : POWER SYSTEM PLANNING

Question Bank (PSP)

1. Explain with neat diagram A time-horizon perspective of power system studies.
2. compare cost analysis of different generation methods.
3. What do you mean by reliability and quality of transmission system
4. Explain different methods of transmission Planning.
5. Explain procedure of energy auditing for electrical systems
6. Describe different methodologies used for load forecasting
7. What do you mean by Distribution Automation? Explain tools of distribution automation.
8. What is generation planning ? What are factors affecting this?
9. Explain What do you mean by system planning State the objectives of system planning
10. Explain the objectives of generation planning.
11. Which are the different techniques for load forecasting ?
12. Explain load growth characteristics for various loads.
13. What do you understand by system planning? Explain main aims of different types of system planning.
14. Elaborate weather load model and explain how to get peak demand forecasting?
15. Explain in detail total energy forecasting.
16. What is integrated resource planning? Explain in brief
17. Write note on Cost Analysis.
18. What is Transmission Planning ?
19. What are factors affecting generation planning ?
20. Explain Energy conservation and its importance
21. Explain in details classification of load forecasting
22. Explain various classifications of power system loads.
23. Define the term load forecasting. Categorize loads in power system.
24. What do you mean by Energy audit?
25. Discuss the possibilities of energy conservation in various sectors.
26. What do you mean by Demand side Management?
27. Explain New algorithms and methods relating to DSM .
28. Explain New algorithms and methods relating to Load Forecasting
29. Explain New algorithms and methods relating to power system planning
30. Write short note on listing of energy conservation opportunities (ECOs)
31. Explain the Data required for Composite System Reliability .
32. Explain the Data required for Composite System Reliability and quality.
33. Discuss the steps involved in DSM planning and implementation.
34. Explain the broad categories of load.

35. An industrial installation has a load of 1 MW at 0.78 p.f. lagging. The tariff is Rs 200per kVA of max demand plus Rs 3.50 per kWh. The cost of installation of capacitors is Rs 500 per kVAr and intrest and depreciation is 15%
    Find
    a. The most economic power factor
    b. Capacitor kVAr to improve the power factor to this value.
    c. Annual electricity bill before installation of capacitors
    d. Annual electricity bill before installation of capacitors
    e. Annual saving due to installation of capacitor.
36. Describe the following terms of load control
    a. Peak clipping
    b. Valley filling
    c. Load shedding
    d. Strategic energy conservation
37. Which are the different techniques for load forecasting ?
38. Explain What do you mean by system planning ?
39. State the objectives of system planning
40. Explain Main aims of different types of system planning
41. Compare/ Differentiate between short, medium and Long term planning .
42. What is generation planning ? What are factors affecting this?
43. What is the impact of weather on load foecasting?
44. What are different generation sources? Explain in brief.
45. What is integrated resource planning? Explain in brief.
46. Describe generation system model.
47. Give objectives of Transmission Planning.
48. Explain Energy conservation and its importance
49. What do you mean by DSM ?
50. Define and explain the concept of energy audit.
51. State and explain the types of energy audit.
52. Categorize loads in power system. Explain load growth characteristics for various loads
53. Explain Capacitor bank controls for DA
54. Explain main aims of
    a) Short term planning
    b) Medium term planning
    c) Long term planning
55. Define Energy Audit. Explain the need of energy audit.
56. Explain Network Reconfiguration in power system
57. Explain Different methods of Load Model.
58. Discuss the different planning tools.
59. Explain in brief Annual Forecasting,
60. Explain in brief, Monthly Forecasting,

61. Explain in brief Total Forecasting
62. Explain different methods of Generation Planning.

Question Bank

Name of Subject: Advanced Concrete Technology

Class: Final Year B.Tech Civil Engineering SEM- II

Unit 1.

1. Write history of cement in detail

2. Explain in detail blended cement

3. Enlist various types of cement used in the market

4. Explain briefly heat of hydration process occurred in the cement

5. Write a short note on
   coarse aggregate
   fine aggregate
   crushed stand

Unit 2

6. Explain admixture, superplasticizer, plasticizers, accelerator, ritardar

7. Explain in detail fly ash,rise husk ash, silica fume

8.define admixture and functions of the admixture in detail
9. Explain the effect using admixture in the concrete.

Unit 3

10. Define workability and factors affecting workability
11. Define the term segregation, bleeding, cohesion of concrete, hardness of concrete
12. Explain the concept of durability of concrete
13. Write a short note on placing and compaction of concrete
14. Explain carbonation of concrete and its effect on it
15. Explain the properties and uses of recycled aggregate
16.explain the effect of impermeability and particle size on concrete.

Unit 4

17. Write a short note on special concrete explain each in details
   High performance concrete
   High strength concrete
   Fibre reinforced concrete
   Lightweight concrete
   High density and radiation shielding concrete

18. What is high volume fly ash concrete.
19. Self compacting concrete
20. Recycled concrete

Unit 5

21. What is mass concrete
22. What is sprayed concrete
23. What is Ferro cement concrete.
24. What is pump concrete

Unit 6

25. Define ready mix concrete and its applications to the construction industry
26. Application of ready mix concrete
27. Explain in detail different types of RMC plants
28. Draw a neat schematic diagram of RMC plant
29. Write specification for RMC plant and enlist different code for RMC plant
30. Write a short note on quantity control attitude on RMC plant

Unit 7

31. Design a concrete mix for M30 grade concrete, assume suitable data.
32. Design a concrete mix for M20 grade concrete, assume suitable data.
33. Design a concrete mix for M20 grade concrete, assume suitable data.
34. Design a concrete mix for M15 grade concrete, assume suitable data.
36. Design a concrete mix for M35 grade concrete, assume suitable data.

Unit 8

37. Write a short note on
Quality assurance
Quality management
Quality audit

Unit 9

38. What are the factor contributing to the cracks in the concrete
39. Write a short note on a repair technique of concrete
40.why and when NDT test are performed, explain with its applications .

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Electrical Engineering Department

Class: - Final Year B. Tech. (Electrical) SEM-II (New w.e.f. Nov 2021)

Subject: Power Quality and FACTS

QUESTION BANK

Questions 4marks each:

1) Write notes on:
    a. under voltage & over voltage
    b. Concepts of transients
    c. short duration variations
    d. long duration variations

2) Define:
    a) Voltage imbalance
    b) Voltage fluctuation
    c) Power frequency variations.

3) What are the International standards of power quality?

4) What is Computer Business Equipment Manufacturers Associations curve?

5) What are the harmonic sources from commercial loads?

6) What are the harmonic sources from industrial loads?

7) Explain TDD & THD.

8) What do you mean by harmonic distortion?

9) What is harmonics? What do you mean by inter harmonics?

10) What is power monitoring? What are the Monitoring considerations?

11) Explain harmonic analyzer & flicker meter.

12) Explain ITI curves.

13) Explain disturbance analyzer.

14) Explain oscilloscopes as PQ monitoring equipment.

15) What are FACTS Controllers? What are its basic types?

16) What is the importance of Transmission interconnections?

17) Write notes on:

A) TCR, TSC B) FC-TCR C) TSC-TCR D) STATCOM, SVC

18) Give explanation for comparison between V-I and V- Q Characteristics of STATCOM and SVC.

19) Write notes on:

A) GCSC B) TSSC C) TCSC D) SSSC

20) What are the characteristics of series compensation?

21) What is the concept of series capacitive compensation of series compensators?

22) Explain working principle of UPFC.

23) Explain the Transient Stability objective with Phase Angle Regulators.

Questions 6marks each:

1) What are voltage variations? Explain its types.
2) Explain the terms:
    a) Voltage sag & swell
    b) Voltage imbalance
    c) Voltage fluctuation
3) Explain voltage and current distortion
4) What is harmonics and what are its indices?
5) What are filters? Explain passive filters.
6) What are filters? Explain active filters.
7) How harmonic distortion is evaluated?
8) What are power quality measurement equipment? Explain its types.
9) Define power quality & power quality monitoring. Enlist the different monitoring equipment with necessary diagrams.
10) Explain the working principle of FC-TCR.
11) Explain the working principle of TSC-TCR.
12) Explain the working principle of SVC.
13) What are the different objectives of shunt compensation?
14) Explain mid-point voltage regulation for line segmentation of shunt compensators.
15) What are the different objectives of series compensation?
16) Explain the working principle of SSSC.
17) Explain the working principle of TCSC.
18) How stability margin is increased when series compensator is used for transmission line?
19) What are the various objectives of voltage and phase angle regulators?
20) What is UPFC? Explain its control structure.
21) What is IPFC? Explain its control structure?
22) What is IPFC? Explain its working principle?
23) What are the applications of IPFC?

Question Bank

1. List Applications of OOP
2. Explain Java Features & Program Structure
3. Explain terms:
    a. Identifiers
    b. Literals
    c. Keywords
    d. Operators
    e. Variables
4. What is class and constructors and its types?
5. What are different command lines available in java?
6. What are java arrays & strings? How to convert strings into objects
7. Differentiate between shadowing & overriding
8. What are different packages available in java?
9. What is an exception and exception handling and Exception handling?
10. Distinguish between Inheritance vs. aggregation
11. What is the difference Between Final, Finally, and Finalize in Java?
12. What is the difference between Abstract class and Interface
13. What are Exception Handling Keywords in Java?
14. What is Java Interface and why it's needed?
15. Difference between overloading vs. overriding with suitable examples.
16. Distinguish between Procedural and Object Oriented Programming.
17. List the Java Applications
18. Explain in detail structure of Java Program
19. Define Java Identifiers, Keywords and Literals with suitable examples.
20. Define static keywords in java. Explain in detail static variables, blocks and methods with suitable examples
21. Define Array and explain different methods to create string objects with suitable examples
22. Inheritance and Polymorphism and Why do we need to use inheritance?
23. Define below keywords:
    a. Super
    b. Final
    c. Abstract
24. Distinguish between Inheritance and aggregation.
25. What is Packages in java? List its advantages and types
26. Describe different ways to convert Strings to Integer in Java
27. What is a Java package and how is it used?
28. What is the mechanism for handling exceptions in Java?
29. What do you mean by object and class? What is the difference between a class and a structure?
30. What is access specifier in java? List & Explain different access specifiers?
31. What is Java Virtual Machine and difference between bytecode and Machine code?

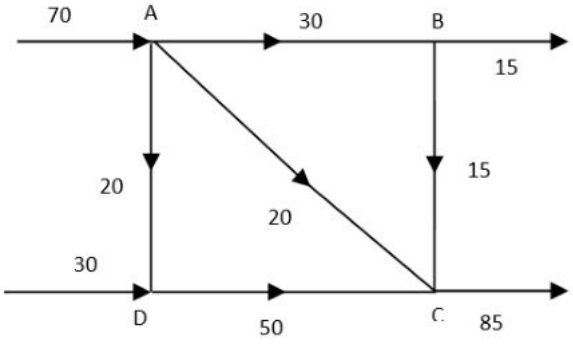
32. Explain the terms
    i. Package
    ii. Import
    iii. Try-catch
    iv. Super
33. What is multi-catch explain with example?
34. What is improved exception handling in java?
35. What is user defined exception?

Question Bank

Subject-Civil
(Environmental Engineering- I) for Class-B Tech II Sem IV (w.e.f.Nov. .2021)
New CBCS

<table>
<tr><td>1.</td><td>Find the population and of a city in 2051 by Arithmetic increase method, geometric increase method and Incremental increase method. (10 marks)

<table><tr><th>Year</th><th>Population</th></tr><tr><td>1981</td><td>50,000</td></tr><tr><td>1991</td><td>70,000</td></tr><tr><td>2001</td><td>95,000</td></tr><tr><td>2011</td><td>125,000</td></tr><tr><td>2021</td><td>1,13,000</td></tr></table></td></tr>
<tr><td>2.</td><td>Calculate the fire demand for the same city of Population of 30 Lakh using various formulae. (4 marks)</td></tr>
<tr><td>3.</td><td>Explain in detail the domestic and public consumption of water. Give typical values in tabular form (5 marks)</td></tr>
<tr><td>4.</td><td>A settling tank is designed for an overflow rate of 3000 lit./m^2/hr. What percentage of particles of diameter (i) 0.05 mm and (ii) 0.035 mm will be removed in this tank for temperature condition of 15°C and specific gravity of particles is 2.65. (5 marks)</td></tr>
<tr><td>5.</td><td>Find the diameter of the particles with specific gravity of 1.3 be removed in a tank having a surface area of 260 m^2 and treating 8 million litres of water per day. Assume temperature of water to be 25°C. (5 marks)</td></tr>
<tr><td>6.</td><td>At a water treatment plant 13 million litres of water is treated daily using Ferrous sulphate and lime. If the dosage of ferrous sulphate is 12 mg per litre, determine the total quantities of ferrous sulphate and lime required daily. (5 marks)</td></tr>
<tr><td>7.</td><td>Enlist various advantages of aeration process in tropical countries? (5 marks)</td></tr>
<tr><td>8.</td><td>Explain various drawbacks of aerators in WTP. (5 marks)</td></tr>
<tr><td>9.</td><td>Maximum daily demand of water in a city is 120 MLD. Design cascade aerator for the same. Draw plan and elevation of the aerator. Assume the inlet pipe diameter as 1.2 m. (5 marks)</td></tr>
<tr><td>10.</td><td>Design circular cascade aerator with following data:
• Quantity of water to be treated: 10 mld
• Loading rate: 0.03 m^2/m^3/hr
• Velocity of flow in collecting channel: 0.9 m/s (7 marks)</td></tr>
<tr><td>11.</td><td>Design underdrainage system for rapid sand filter for 20 MLD of water flow. (7 marks)</td></tr>
<tr><td>12.</td><td>Write short note on Tube settlers in sedimentation tank. (5 marks)</td></tr>
<tr><td>13.</td><td>What do you understand by flocculation? Why is it necessary? (5 marks)</td></tr>
<tr><td>14.</td><td>Explain chemistry of Ion exchange method. (5 marks)</td></tr>
<tr><td>15.</td><td>Explain various troubles in Rapid sand filters. (5 marks)</td></tr>
<tr><td>16.</td><td>Design a Flocculator for the flow of 10 MLD. (7 marks)</td></tr>
<tr><td>17.</td><td>Explain the chemical methodology adopted in usage of Alum and copperas in coagulation process.</td></tr>
</table>

	(5 marks)
18.	Differentiate between coagulation and flocculation in WTP. (5 marks)
19.	With a neat sketch explain back washing of rapid sand gravity filter. (5 marks)
20.	What is 'water hammer pressure' Explain with a labelled diagram. (5 marks)
21.	A large service reservoir supplies water to two colonies. Colony A- Population 10000 Colony B- Population 50000 Determine the diameter of supply pipe. Average daily demand is 150 lpcd (7 marks)
22.	Differentiate between intermittent and continuous water supply system. (5 marks)
23.	Explain chlorination process with a neat graph. (5 marks)
24.	Enlist and explain various types of chlorination methods using various chlorine materials. (5 marks)
25.	Explain numerous methods of Disinfection. (5 marks)
26.	Explain Packaged drinking water plant with a neat diagram. (5 marks)
27.	Explain Reverse Osmosis Membrane Filtration with a neat sketch. (5 marks)
28.	Differentiate RO and Electrodialysis method. (5 marks)
29.	Enlist and explain the various types of storage reservoirs. (5 marks)
30.	Design thrust block of a 1300 mm diameter main conveying water at a pressure of 10 kg/m^3, at location where deviation angle is 45°, in horizontal plane. The subsoil has a density of 180 kg/m^3, angle of internal friction $\varphi = 20°$ and zero cohesion. Assume velocity of flow as 2 m/sec. Take unit weight of concrete = 2400 kg/m^3. (5 marks)
31.	Explain with neat sketch grid iron system of distribution system. (5 marks)
32.	Discuss corrosion control in metal pipes. (5 marks)
33.	Write short note on Ultra filtration process. (5 marks)
34.	Calculate discharge through various pipes using Hardy cross method if the "K" values in the expression for loss of head $h_f = kQ^2$, & AB, BC, AC, AD, DC are 4, 1, 3, 2 & 1 respectively, find discharge through each pipe & indicate direction of flow. Take two trials. (5 marks) 
35.	Discuss leak detection in the distribution system. (5 marks)
36.	Design underdrainage system for rapid sand filter for 26 MLD of water flow. (5 marks)
37.	Enlist various types of valves used in water distribution system. (7 marks)
38.	Write a short note on stand pipes. (5 marks)
39.	Explain storage of water in ESR using neat graph. (5 marks)
40.	Explain in detail on different types of losses in pipes. (5 marks)

P.A.H. Solapur University, Solapur
S.Y. B. Tech (Computer Science & Engineering) Part-II CBCS Honors Degree in Data Science
Semester IV
Question Bank
Hn421: MATHEMATICS FOR DATA SCIENCE

Q.1. Define Data Science? List the applications of Data Science.

Q.2. Find the rank of the matrix A=
$$\begin{bmatrix} 1 & 2 & 3 \\ 6 & -5 & 4 \\ -9 & 8 & 7 \end{bmatrix}$$

Q.3. Consider the individual series X= {1, 2, 3, 4, 5, 6, 7, 8} find the Quartile deviation.
Q.4. Write down the steps to find the rank of the matrix
Q.5. Illustrate the importance of linear algebra.
Q.6. Illustrate the use of statistics in data science
Q.7. Explain the importance of probability in data science.
Q.8. Define dispersion and illustrate the types of dispersion.
Q.9. Illustrate the type of dispersion range with an example.
Q.10. Illustrate the type of dispersion quartile deviation with an example.
Q.11. Illustrate the type of dispersion mean deviation with an example.
Q.12. Illustrate the type of dispersion standard deviation with an example.
Q.13. Define correlation and illustrate the types of correlation.
Q.14. Explain the spearman's rank correlation is the type of correlation with an example.
Q.15. Explain the Karl Pearson's coefficient of correlation is the type of correlation with an example.
Q.16.Define Central tendencies and explain the different types of central tendencies with an example.
Q.17.Consider the discrete series X= {11, 22, 32, 4, 53, 6, 24, 43} and f= {8, 5, 6, 1, 9, 13, 4, 6,}, find the quartile deviation .

Q.18. Consider the discrete series X= {11, 22, 32, 4, 53, 6, 24, 43} and f= {8, 5, 6, 1, 9, 13, 4, 6,}, find the standard deviation.
Q.19.Consider the discrete series X= {11, 22, 32, 4, 53, 6, 24, 43} and f= {8, 5, 6, 1, 9, 13, 4, 6,}, find the mean deviation.
Q.20.Consider the continuous series X= {0-10, 10-20, 20-30, 30-40, 40-50} and f= {7, 11, 4, 6, 2, 9}, find the quartile deviation.

Q.21. Find the Eigen values and Eigen vectors of the matrix
$$A=\begin{bmatrix} 9 & 23 & 3 \\ 0 & -3 & 4 \\ 0 & 0 & 7 \end{bmatrix}$$

Q.22. Find the Eigen values of the matrix

$$A=\begin{bmatrix}19 & 13 & 4\\ 9 & 6 & 14\\ 1 & 3 & 7\end{bmatrix}$$

Q.23. Find the Eigen vectors of the matrix

$$A=\begin{bmatrix}20 & 12 & 0\\ 6 & -7 & 4\\ 1 & 0 & 2\end{bmatrix}$$

Q.24. Find the Eigen values and Eigen vectors of the matrix

$$A=\begin{bmatrix}9 & 23 & 4 & 3\\ 0 & -3 & 3 & 4\\ 0 & 0 & 1 & 7\end{bmatrix}$$

Q.25. Write down the steps how to find Eigen vectors from the given matrix.

Q.26 a certain couple tells you that they have three children, at least one of which is a girl. Compute the probability that they have three girls?
Q.27.Explain the Baye's theorem with an example
Q.28. what is conditional probability explain in detail with suitable example
Q.29. In any 20-minute interval, there is a 10% probability that you will see at least one shooting star. Calculate the probability that you see at least one shooting star in the period of an hour?
Q.30.Explain the dependence and independence variable with an example
Q.31. Explain the random variable with an example
Q.32. Define normal distribution and explain with an example
Q.33. Define and explain the central limit theorem with an example
Q.34. Compare binomial distribution and normal approximation
Q.35. Explain statistical hypotheses testing with suitable example
Q.36.Explain the concept of Bayesian inference
Q.37. Explain the concept of confidence intervals
Q.38. what is P-hacking explain in detail
Q.39. Define optimization with an example
Q.40.Explain the idea behind the gradient descent method in detail
Q.41. How to estimate the gradients explain in detail with example
Q.42 What is optimization and explain the various types of optimization
Q.43. Explain the components of optimization problem
Q.44. Hospital records show that 85% of patients suffering from a disease die due to that disease. Compute the probability that 3 out of 5 randomly selected patients recover?
Q.45. A group of 45 students is randomly split into 3 classes of equal size. All partitions are equally likely. Calculate the probability that Ram and sham will end up in the same class?
Q.46. Consider the continuous series X= {0-10, 10-20, 20-30, 30-40, 40-50} and f= {7, 11, 4, 6, 2, 9}, find the standard deviation.
Q.47. Consider the continuous series X= {0-10, 10-20, 20-30, 30-40, 40-50} and f= {7, 11, 4, 6, 2, 9}, find the mean deviation.
Q.48. Explain the non gradient technique in detail
Q.49.Describe the types of optimization
Q.50. Differentiate between mean and median with example.

EXAMINATION- S. Y. B. Tech (CSE) wef.2021

SUB-DISCRETE MATHEMATICAL STRUCTURE

QUESTION BANK

1. Define Power set. Given S= {a_1, a_2, a_3,……, a_8}.what subsets are represented by B_{19}, and B_{124}

2. Given a set X= {1, 3, 6,12, 24, 36} and partially ordered relation on X, which satisfy divides condition draw the Hasse diagram of POSET. And indicate a set is totally ordered or not

3. Define monoid and explain the homomorphism of monoid.

4. Define the following and give example of each.

   a. Ordered pair and order n- tuple b. POSET

5. Explain the procedure to find relation matrix. Let A= {1, 2, 3…….10} and relation R on set A is R = {<x, 2x>| x € A} Obtain the relation matrix and graph of relation.

6. Define relation and explain the properties of relation with example.

7. Define Cartesian product? Let A= {1, 2, 3}, B= {α, β}, find AXB, BXA and (AXB) ∩ (BXA)

8. Let Z be a set of integers and R be relation called "Congruence modulo 3" defined by R= {<x, y>| x € Z and y € Z and (x-y) is divisible by 3}, determine Relation and equivalence classes generated by elements of Z.

9. List the properties of algebraic system < I, +, *> where I is the set of integers with addition and multiplication operation

10. Define function and Explain types of function with example.

11. Define monoid and explain the homomorphism of monoid.

12. What is a Inverse function?

13. f(x)=x+5, g(x)=x-3, h(x)=4x for x € R where R is the set of Real No. Find g o f,

    f o (h o g), h o h , g o g.

14. Explain following with example a] Sub Semigroup b] Sub monoid c]

15. Define function? Let X= {1, 2, 3, 4} determine the function f: X→X such that f≠ Ix and is one to one onto find f^2=f o f, f^3=$f^2$of, f^{-1}

16. Let Z_4 be the set of equivalence classes generated so that Z_4= {[0], [1], [2], [3]}. Let $+_4$ on Z_4 is given by [i] $+_4$ [j]=[(i + j) mod 4] Determine Algebraic System and list out applicable properties on algebraic system.

17. Define & Explain Duality Law with Example

18. Define an index set. Given S= {a_1, a_2, a_3,……, a_8}.what subsets are represented by B_{47} and B_{120}

19 Define the following and give example of each. a. Ordered pair and order n- tuple b. proposition

20 What is a Relation? Explain its properties?

21 Given a set X={2, 3, 4, 5, 6, 7, 8} then divides is a partially ordered relation on X draw the Hasse diagram of POSET <X, | > where | means divides.

22 Let f: R->R be given by f(x)=x3-2 find f-1. Where R is Real no. set.

23 Obtain PCNF and PDNF of the following without constructing table

a. $(\neg p \rightarrow q) \wedge (q \leftrightarrow p)$ b. $(p \rightarrow (q \wedge r)) \wedge (\neg p \rightarrow (\neg q \wedge \neg r))$

24. List all possible function from X={a, b, c} to Y={0, 1}indicate in each case whether function is one to one ,is onto, is one to one onto.

25. What is the difference between composition of relation & composition of function

26. Define algebraic system and state the properties.

27. Let S= {a, b, c} then find P(S) (power set of S) and draw the hasse diagram for the POSET<P(S), ≤ >.

28. Define the Homomorphism & its types with respect to Semigroup

29. Write a short note on polish expression and their compilation

30. List the properties of algebraic system < I, +, *> where I is the set of integers with addition and multiplication operation.

31. Define set & explain operation of the set with example

32. Define the term LUB & GLB with the help of example.

33. Explain Group as an algebraic system and define permutation group in detail

34. Show that in group <G, *> if for every a, b € G, $(a * b)^2 = a^2 * b^2$ must be abelian group

35.Composition table for <G, * > and < S, ◇ > are given below show that they are groups and are Isomorphic

*	p1	p2	p3	p4
p1	p1	p2	p3	p4
p2	p2	p1	p4	p3
p3	p3	p4	p1	p2
p4	p4	p3	p2	p1

◇	q1	q2	q3	q4
q1	q3	q4	q1	q2
q2	q4	q3	q2	q1
q3	q1	q2	q3	q4
q4	q2	q1	q4	q3

S.Y. B.TECH. - C.S.E. (Part – II) (w.e.f. June 2019) Examination, 2022

DATA STRUCTURES

Question Bank

Chapter-1: Introduction to Data Structures & Stack

4 Marks

Q1) Explain the different types of data structures with suitable examples.

Q2) Describe the different types of operations performed on a stack.

Q3) Explain the concept of evaluation of postfix expression using stack.

Q4) Differentiate between linear and non-linear data structures.

8 Marks

Q1) Write a program for conversion of infix expression to postfix expression using stack.

Q2) Write a program for evaluation of postfix expression using stack.

Q3) Describe the procedure for conversion of infix expression to postfix expression using stack.

Chapter-2: Queues

4 Marks

Q1) Write a note on the different operations performed on a Linear Queue.

Q2) Differentiate between a stack and a queue.

Q3) Differentiate between a linear queue and a circular queue.

Q4) Explain the Priority Queue data structure with its operations.

8 Marks

Q1) Write a C program to implement a Linear Queue and its operations.

Q2) Write a C program to implement a Circular Queue and its operations.

Q3) Write a C program to implement a Priority Queue and its operations.

Chapter-3: Lists

4 Marks

Q1) Write a short note on Linked Lists.

Q2) Write C code for:

A) insertion of a node at the beginning of a Singly Linked List.

B) insertion of a node at the end of a Singly Linked List.

Q3) Write C code for:

A) deletion of a node from the beginning of a Singly Linked List.

B) deletion of a node from the end of a Singly Linked List.

Q4) Write C code for:

A) insertion of a node at the beginning of a Singly Circular Linked List.

B) insertion of a node at the end of a Singly Circular Linked List.

Q5) Write C code for:

A) deletion of a node from the beginning of a Singly Circular Linked List.

B) deletion of a node from the end of a Singly Circular Linked List.

Q6) Write C code for:

A) insertion of a node at the beginning of a Doubly Linked List.

B) insertion of a node at the end of a Doubly Linked List.

Q7) Write C code for:

A) deletion of a node from the beginning of a Doubly Linked List.

B) deletion of a node from the end of a Doubly Linked List.

Q8) Write C code for:

A) insertion of a node at the beginning of a Doubly Circular Linked List.

B) insertion of a node at the end of a Doubly Circular Linked List.

Q9) Write C code for:

A) deletion of a node from the beginning of a Doubly Circular Linked List.

B) deletion of a node from the end of a Doubly Circular Linked List.

8 Marks

Q1) Write a C program to implement a Queue using Linked List.

Q2) Write a C program to implement a Stack using Linked List.

Q3) Explain the process of performing polynomial addition using Linked List.

Chapter-4: Trees

4 Marks

Q1) Explain the different operations on a binary tree.

Q2) Write a short note on Binary Search Tree.

Q3) Describe the different types of Threaded Binary Tree with suitable examples.

Q4) Write a short note on Linked implementation of Binary Trees.

8 Marks

Q1) Write a C program to implement a Binary Search Tree and its traversal.

Q2) Write a C program to implement the deletion operation on a Binary Search Tree.

Q3) Explain the different traversal techniques of binary tree with suitable examples.

Chapter-5: Multiway Trees

4 Marks

Q1) Differentiate between B Tree and B+ Tree.

Q2) Describe Multiway Search Trees with example.

Q3) Write a short note on B Trees.

Q4) Describe B+ Trees with example.

8 Marks

Q1) Explain the operations on a B Tree with suitable example.

Q2) Write a short note on Balanced Multiway Trees using suitable examples.

Q3) Explain the operations on a B+ Tree with suitable example.

Chapter-6: Height Balanced Trees

4 Marks

Q1) Define AVL Tree. What is balance factor of a node in AVL Tree? Draw the diagram of a sample AVL Tree and find the balance factors of all nodes in the tree.

Q2) Explain the different types of rotations in AVL Tree.

Q3) Write a short note on Height Balanced Trees.

Q4) Write a short note on AVL Trees.

8 Marks

Q1) Using a suitable example, explain when a need does arise for single rotation and when a need does arise for double rotation in an AVL Tree.
Q2) Explain the insertion operation in AVL Tree using suitable examples.
Q3) Explain the deletion operation in AVL Tree using suitable examples.

Chapter-7: Graphs

4 Marks

Q1) Describe the Adjacency Matrix representation of graph.
Q2) Write a short note on Adjacency List representation of graph.
Q3) Write a short note on Depth First Search (DFS) traversal technique of Graph.
Q4) Write a short note on Breadth First Search (BFS) traversal technique of Graph.

8 Marks

Q1) Write a C program to implement a Graph and operations on it using Adjacency Matrix representation.
Q2) Write a C program to implement a Graph and its operations using Adjacency List representation.
Q3) Describe the process of finding shortest path in graph using Dijkstra's algorithm.

S.Y. B.TECH. - C.S.E. (Part – I) (New w.e.f. June 2021) Examination, 2022

DATA STRUCTURES

Question Bank

Chapter-1: Introduction to Data Structures & Searching-Sorting

4 Marks

Q1) Explain the different types of data structures with suitable examples.

Q2) Differentiate between linear and non-linear data structures.

Q3) Explain in short the bubble sort technique.

Q4) Describe in short the selection sort technique.

Q5) Write a short note on insertion sort technique.

8 Marks

Q1) Using a suitable example, describe the quick sort technique.

Q2) Explain the merge sort technique using suitable example.

Q3) Explain the different searching techniques using examples.

Q4) Describe in detail the radix sort technique using example.

Chapter-2: Hashing

4 Marks

Q1) Define hashing. Explain in short the criteria for choosing a good hash function.

Q2) Write a short note on the collision resolution technique of Linear Probing using suitable example.

Q3) Using suitable example, describe in short about the collision resolution technique of Quadratic Probing.

Q4) Explain in short about the collision resolution technique of Double Hashing using suitable example.

8 Marks

Q1) Explain in detail about the different collision resolution techniques in hashing.

Q2) Write as short note on collision resolution by open addressing.

Q3) Give a detailed description on collision resolution by chaining using suitable example.

Chapter-3: Stack and Queue

4 Marks

Q1) Describe the different types of operations performed on a stack.

Q2) Explain the concept of evaluation of postfix expression using stack.

Q3) Write an algorithm for converting an infix expression to postfix expression using stack.

Q4) Write a note on the different operations performed on a Linear Queue.

Q5) Differentiate between a stack and a queue.

Q6) Differentiate between a linear queue and a circular queue.

Q7) Explain the Priority Queue data structure with its operations.

8 Marks

Q1) Write a program for evaluation of postfix expression using stack.

Q2) Describe the procedure for conversion of infix expression to postfix expression using stack.

Q3) Write a C program to implement a Linear Queue and its operations.

Q4) Write a C program to implement a Circular Queue and its operations.

Q5) Write a C program to implement a Priority Queue and its operations.

Chapter-4: Lists

4 Marks

Q1) Write a short note on Linked Lists.

Q2) Write C code for:

A) insertion of a node at the beginning of a Singly Linked List.

B) insertion of a node at the end of a Singly Linked List.

Q3) Write C code for:

A) deletion of a node from the beginning of a Singly Linked List.

B) deletion of a node from the end of a Singly Linked List.

Q4) Write C code for:

A) insertion of a node at the beginning of a Singly Circular Linked List.

B) insertion of a node at the end of a Singly Circular Linked List.

Q5) Write C code for:

A) deletion of a node from the beginning of a Singly Circular Linked List.

B) deletion of a node from the end of a Singly Circular Linked List.

Q6) Write C code for:

A) insertion of a node at the beginning of a Doubly Linked List.

B) insertion of a node at the end of a Doubly Linked List.

Q7) Write C code for:

A) deletion of a node from the beginning of a Doubly Linked List.

B) deletion of a node from the end of a Doubly Linked List.

Q8) Write C code for:

A) insertion of a node at the beginning of a Doubly Circular Linked List.

B) insertion of a node at the end of a Doubly Circular Linked List.

Q9) Write C code for:

A) deletion of a node from the beginning of a Doubly Circular Linked List.

B) deletion of a node from the end of a Doubly Circular Linked List.

8 Marks

Q1) Write a C program to implement a Queue using Linked List.

Q2) Write a C program to implement a Stack using Linked List.

Q3) Explain the process of performing polynomial addition using Linked List.

Chapter-5: Trees

4 Marks

Q1) Explain the different operations on a binary tree.

Q2) Write a short note on Binary Search Tree.

Q3) Describe the different types of Threaded Binary Tree with suitable examples.

Q4) Write a short note on Linked implementation of Binary Trees.

8 Marks

Q1) Write a C program to implement a Binary Search Tree and its traversal.

Q2) Write a C program to implement the deletion operation on a Binary Search Tree.

Q3) Explain the different traversal techniques of binary tree with suitable examples.

Chapter-6: Multiway Trees

4 Marks

Q1) Differentiate between B Tree and B+ Tree.

Q2) Describe Multiway Search Trees with example.

Q3) Write a short note on B Trees.

Q4) Describe B+ Trees with example.

8 Marks

Q1) Explain the operations on a B Tree with suitable example.

Q2) Write a short note on Balanced Multiway Trees using suitable examples.

Q3) Explain the operations on a B+ Tree with suitable example.

Chapter-7: Height Balanced Trees

4 Marks

Q1) Define AVL Tree. What is balance factor of a node in AVL Tree? Draw the diagram of a sample AVL Tree and find the balance factors of all nodes in the tree.

Q2) Explain the different types of rotations in AVL Tree.

Q3) Write a short note on Height Balanced Trees.

Q4) Write a short note on AVL Trees.

8 Marks

Q1) Using a suitable example, explain when a need does arise for single rotation and when a need does arise for double rotation in an AVL Tree.

Q2) Explain the insertion operation in AVL Tree using suitable examples.

Q3) Explain the deletion operation in AVL Tree using suitable examples.

Chapter-8: Graphs

4 Marks

Q1) Describe the Adjacency Matrix representation of graph.

Q2) Write a short note on Adjacency List representation of graph.

Q3) Write a short note on Depth First Search (DFS) traversal technique of Graph.

Q4) Write a short note on Breadth First Search (BFS) traversal technique of Graph.

8 Marks

Q1) Write a C program to implement a Graph and operations on it using Adjacency Matrix representation.

Q2) Write a C program to implement a Graph and its operations using Adjacency List representation.

Q3) Describe the process of finding shortest path in graph using Dijkstra's algorithm.

Question Bank

S. Y. B. Tech. Electrical Engineering Semester- I

Engineering Mathematics III

Section I

Unit 1 Linear Differential Equations with Constant Coefficients

Question for 3 Marks

1) $(D^3 - 1)\, y = (e^x + 1)^2$
2) $(D^3 - 3D^2 + 3D - 1)\, y = X^{\frac{1}{2}} e^X$
3) $(D^3 + 1)\, y = \sin 2x$
4) $(D^2 - 5D + 6)\, y = \sin 3x$
5) $(D^3 + 3D^2 + 2D)\, y = x^2 + x$
6) $\frac{d^3 y}{dt^3} + \frac{dy}{dt} = \cos t + t^2 + 3$
7) $(D^4 + 10D^2 + 9)\, y = \cos(2x+3)$
8) $(D^2 - 1)\, y = x \sinh x$

Question for 5 Marks

1) $(D^2 + 3D + 2)\, y = \sin e^X$
2) $(D^2 - 2D + 1)\, y = x \sin x$
3) $(D^2 + 4)\, y = x \cos x$
4) $(D^2 - 1)\, y = x e^x \sin x$

Unit 2 Homogeneous and Legendre's Differential Equations

Question for 3 Marks

1) $x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + 4y = 2x^2$
2) $x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + 2y = x \log x$
3) $x \frac{d^3 y}{dx^3} + 2 \frac{d^2 y}{dx^2} = x^2$
4) $(1 + x)^2 \frac{d^2 y}{dx^2} + (1 + x) \frac{dy}{dx} + y = 2 \sin \log(1 + x)$
5) $(5 + 2x)^2 \frac{d^2 y}{dx^2} - 6(5 + 2x) \frac{dy}{dx} + 8y = 6x$

Question for 5 Marks

1) $x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + 5y = x^2 \sin(\log x)$
2) $x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + 4y = \cos(\log x) + x \sin(\log x)$
3) $x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + 4y = \frac{1 + \sin(\log x)}{x}$

4) $(3x+2)^2\frac{d^2y}{dx^2}+5(3x+2)\frac{dy}{dx}-3\,y=x^2+x+1$

5) $(x+2)^2\frac{d^2y}{dx^2}-(x+2)\frac{dy}{dx}+y=3x+4$

6) In LC circuit the charge q on a plate of a condenser is given by

$\frac{d^2q}{dt^2}+\frac{q}{CL}=\frac{E}{L}sinnt$ Prove that the charge at any time t is given by

$q=\frac{E}{2Ln^2}(sinnt-ntcosnt)$ where $n^2=\frac{1}{LC}$

7) In LC circuit the charge Q on a plate of a condenser is given by

$\frac{d^2Q}{dt^2}+\frac{Q}{CL}=\frac{E}{L}cos\omega t$. $Q=Q_0$ & $i=i_0$ *when* $t=0$

Prove that the charge at any time t is given by

$Q=Q_0cos\omega t+\frac{i_0}{\omega}sin\omega t+\frac{E_0}{2L\omega}tsin\omega t$ Where $\omega^2=\frac{1}{LC}$

Unit 3 Laplace Transform

Question for 3 Marks

1) Find $L\{t^2+e^{-3t}+3\,sin2t\}$
2) Find Laplace transform of $t\,Cos2t$
3) Find Laplace transform of $\frac{cos2t-cos3t}{t}$
4) Find Laplace transform of $\int_0^t u\,e^{-2u}\sin 4u\,du$
5) Evaluate $\int_0^\infty \frac{e^{2t}-e^{3t}}{t}dt$ by using Laplace Transform
6) If $f(t)=\frac{sint}{t}$ find $L\{f'(t)\}$
7) Find $L^{-1}\{\left\{\frac{3s+12}{s^2-36}\right\}$
8) Find $L^{-1}\{\tan^{-1}(\frac{2}{s})\}$
9) Find $L\{u(t-7)t^2\}$
10) Find $L\{u(t-7)sin2t\}$
11) Find $L^{-1}\left\{e^{-4s}\frac{1}{s^2}\right\}\}$
12) Find inverse Laplace transform of $log\left(\frac{s-a}{s-b}\right)$

Question for 5 Marks

1) Find inverse Laplace transform of $\frac{1}{s^2(s^2+9)}$ by Convolution theorem
2) Find inverse Laplace transform of $\frac{1}{s(s^2+5s+6)}$ by Convolution theorem
3) Find inverse Laplace transform of $\frac{1}{(s-1)(s+2)}$ by Convolution theorem

Section II

Unit4 Partial Differential Equations

Question for 3 Marks

1) $x^2p^2 + y^2q^2 = z^2$
2) $9(p^2z + q^2) = 4$
3) $p^3 + q^3 = 27z$
4) $p^2 - pq = 1 - z^2$
5) $z^2(p^2 + q^2 + 1) = k^2$
6) $p^2 + q^2 = z$
7) $px - qy = y^2 - x^2$
8) $py = 2xy + \log q$
9) $p^2 - q^2 = x - y$
10) $(mz - ny)p + (nx - lz)q = (ly - mx)$
11) $px + qy = z$
12) $px^2 + qy^2 = (x + y)z$

Question for 5 Marks

1) $x(y - z)p + y(z - x)q = z(x - y)$
2) $\frac{y^4z}{x}p + zx^3q = xy^2$
3) Solve the following partial differential equation $\frac{\partial z}{\partial x} - k\frac{\partial z}{\partial y} = 0$ by the method of separation variables.
4) Solve the following partial differential equation $3x\frac{\partial z}{\partial x} - 5y\frac{\partial z}{\partial y} = 0$. by the method of separation of variables.
5) Solve the following partial differential equation $\frac{\partial u}{\partial x} - 2\frac{\partial u}{\partial t} + u$ given $u(x, 0) = 6e^{-3x}$.
6) Solve the following partial differential equation $\frac{\partial z}{\partial x} - 2\frac{\partial z}{\partial y} = z$ Given $z(x,0) = 3e^{-5x} + 2e^{-3x}$

Unit 5 Functions of Complex Variables

Question for 3 Marks

1) Evaluate $\int_C |z|dz$ where C is the left half of the unit circle $|z| = 1$ from $z = -i$ to $z = i$
2) Evaluate $\int_C \bar{z}dz$ where C is the circle $|z| = 1$
3) Evaluate $\int_C \frac{2z+3}{z}dz$ where C is the lower half of the unit circle $|z| = 2$

4) Evaluate $\int_C z^2 dz$ where C is the $x = r\cos\theta$, $y = r\sin\theta$ from $\theta = 0$ to $\theta = \frac{\pi}{3}$

5) Evaluate $\int_C \frac{z+3}{z^2-2z-5} dz$ where C is the circle $|z - 1| = 1$

6) Evaluate $\int_C \frac{\sin^6 z}{\left(z-\pi/6\right)^3} dz$ where C is $|z| = 1$

7) Evaluate $\int_C \frac{3z^2+2z}{(z^2-1)} dz$ where C is $|z| = 2$

8) Evaluate $\int_C \frac{e^{2z}}{(z-1)^4} dz$ where C is $|z - 1| = 3$

9) Evaluate $\int_C \frac{z+2}{(z-3)(z-4)} dz$ where C is $|z| = 1$

10) Calculate residue of $\frac{\sin z}{z^2}$

11) Calculate residue of $\frac{1-\cos z}{z^4}$

12) Calculate residue of $\frac{z^2}{(z-1)(z-2)^2}$ at z=1

Question for 5 Marks

1) Evaluate $\int_0^{1+i} (x^2 - iy) dz$ along the path $y = x$, $y = x^2$

2) Evaluate $\int_0^{1+i} (x^2 + iy) dz$ along the path $y = x$, $y = x^2$

3) Evaluate $\int_0^{1+i} z^2 dz$ along the path $y = x$, $x = y^2$

4) Evaluate $\int_0^{1+i} (x - y + ix^2) dz$ along the line $z = 0$, to $z = 1 + i$

5) Evaluate $\int_{1-i}^{2+i} (2x + iy + 1) dz$ along the line $1 - i$ to $2 + i$

Unit 6 Z transform

Question for 3 Marks

1) Find Z transform of $f(k) = \begin{cases} 3^k, & k \geq 0 \\ 4^k, & k < 0 \end{cases}$

2) Find $Z\left\{\cos\left(\alpha k + \frac{\pi}{2}\right)\right\}$, $k \geq 0$

3) Find $Z\left[\frac{2^k}{k!}\right] k \geq 0$

4) Find Z transform of $f(k) = a^k$, $k \geq 0$

5) Find Z transform of $f(k) = a^{|k|}$

6) Find Z transform of $f(k) = c^k \sin ak$, $k \geq 0$

7) Find Z transform of $f(k) = c^k \cosh ak$, $k \geq 0$

8) Find Z transform of $f(k) = \{\frac{1}{2^k} * \frac{1}{3^k}\}$

9) Find $Z^{-1}\left\{\frac{1}{z-a}\right\}$, $|z| < a$

10) Find $Z^{-1}\left\{\frac{z}{z-a}\right\}$, $|z| < a$

11) Find $Z^{-1}\left\{\frac{1}{(z-1)^2}\right\}$,$|z| > 1$

12) Find inverse Z transform of $\frac{1}{(z-5)}$, $|z| < 5$

13) Find Z transform of Unit impulse function $\delta(k) = \begin{cases} 1, & k = 1 \\ 0, & k = 0 \end{cases}$

Question for 5 Marks

1) Find $Z\{k5^k\}$, $k > 0$
2) Find inverse Z transform of $\frac{z}{(z-1)(z-2)}$, $|z| > 2$
3) Find inverse Z transform of $\frac{1}{(z-3)(z-2)}$, $2 < |z| < 3$
4) Find inverse Z transform of $\frac{3z^2-18z+26}{(z-2)(z-3)(z-4)}$, $3 < |z| < 4$

S.Y. B.Tech. (Part – I) (NEW) (CBCS) Examination, April/May-2022
Mechanical Engineering

MECHANICS OF MATERIALS

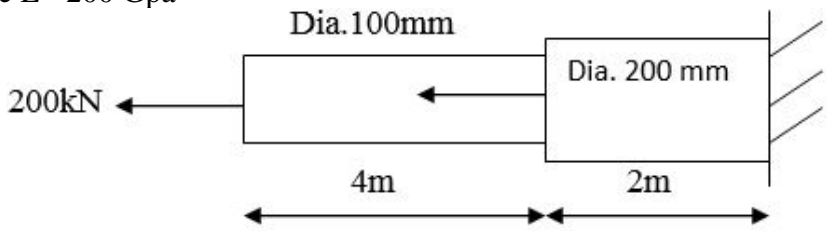
QUESTION BANK

Section – I

CHAPTER-1 SIMPLE STRESS AND STRAIN

SHORT TERM QUESTIONS

1	A copper rod 32 mm in diameter 600 mm long is enclosed in steel tube of internal diameter 32 mm and thickness 20 mm are rigidly attached to act as composite bar. If bar is subjected to axial tensile load of 110kN find a) stress induced in each material b) Load shared by each material c) Elongation of composite bar.	5 marks
2	Describe stress strain diagram ductile material	4 marks
3	A steel rod 16 m long is at a temperature of 16°C. Find the free expansion of the length when the temperature is raised to 66°C. Find temperature stress produced, when: i) The expansion of the rod is prevented. ii) The rod is permitted to expand by 6 mm. Take: $\alpha = 12 \times 10^{-6}$ per °C and E == 200 GN/m^2	6 marks
4	A bar of 30mm diameter was subjected to a pull of 54kN and measured extension for 300mm gauge length was found to be 0.112mm while change in diameter was 0.00366mm.Calcualte the values of three elastic moduli for the material of bar	6 marks
5	Determine the total extension of bar loaded as shown in figure. Take E =200 Gpa	6 marks



LONG TERM QUESTIONS

1 A circular bar 60mm in diameter subjected to tensile load of 500kN. It is found that extension over 300mm bar length is 0.6mm while decrease in lateral direction is 0.05mm. Calculate E, G, K and poission's ratio. 8 marks

2 An M.S.Bar steel rod of 12mm diameter has brass sleeve around it. The sleeve has an internal diameter of 12mm and an external diameter of 20mm.The rod and the sleeve are firmly fixed together at each end and subjected to pull of 12kN.Find stresses in M.S.rod and the brass sleeve and also load carried by them. Take Esteel=200kN/mm^2 Ebrass=100kN/mm^2. 8 marks

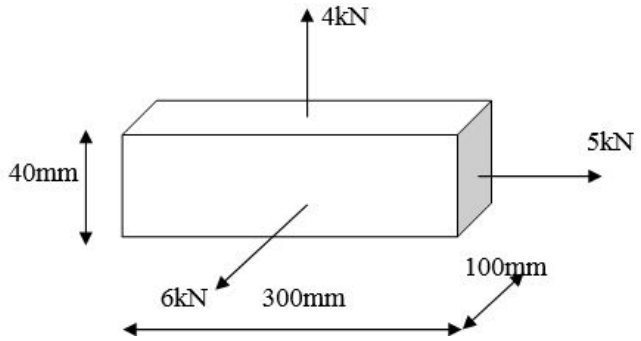
3 A steel bar is centrally enclosed in an aluminum tube and is compressed between two rigid parallel plates at the ends by a force of 500 KN. The diameter of steel bar is 42 mm and the inner and outer diameter of the aluminum tubes are 60 mm and 100 mm respectively. The length of bar and the tube is 1.2 m. Determine the stresses induced in the steel bar aluminum tube. Take, E for steel = $2.1 \text{ X } 10^5$ N/mm^2 : E for Aluminum =$7.2 \text{ X } 10^4$ N/mm^2. 8 marks

4 Following data relate to a bar subjected to a tensile test: 8 marks

Diameter of the bar	d = 30 mm
Tensile load	p = 56 kN
Gauge length	L= 300 mm
Extension of the bar	δL= 0.12
Change in diameter	δd= 0.00356 mm

Calculate: i) Poisson's ratio ii) The values of three moduli, E, K and C.

5 A metallic bar 320mm x 100mm x40mm is subjected to external force as shown in figure. Determine change in volume of block Take E=200Gpa and poission's ratio=0.25 8 marks



CHAPTER-2 A] TORSIONS OF CIRCULAR SHAFTS

SHORT TERM QUESTIONS

1	State the assumptions made in the theory of torsion of circular shafts.	4 marks
2	A solid circular shaft and a hollow circular shaft whose inner diameter is 3/4 its outer diameter are of the same material and of equal length. They are required to transmit the same torque. Compare the weights of these two shafts if the maximum shear stress developed in them is same	6 marks
3	During tests on a sample of steel bar 25mm diameter, it is found that a pull of 50kN produces extension of 0.095mm on length of 200 mm and a torque of 200N-m produces angle of twist of 0.9degrees on a length of 250mm.Find Poisson's ration of steel.	6 marks
4	prove that the torque transmitted by a solid when subjected to torsion is given by: $T = \frac{\pi}{16}\,\tau.\,D^3$ where, D = Dia. of solid shaft, τ = Max. Shear stress.	6 marks
5	Derive an expression for torque transmitted by a hollow circular shaft.	6 marks

LONG TERM QUESTIONS

1	A solid cylindrical shaft is to transmit 300kW at 100rpm. If shear stress is not to exceed 80MN/m^2.What percentage saving in weight would be obtained if this shaft is replaced by a hollow shaft whose internal diameter is 0.6 of the external diameter having same length, same material and the same maximum shear stress.	8 marks
2	A hollow shaft is to transmit 360 kW at 76 rpm. If the shear stress is not to exceed 68 MN/m^2 and internal diameter is 0.55 of the external diameter, find the external and internal diameters assuming that the maximum torque is 1.6 times the mean.	8 marks
3	A hollow circular shaft has inner and outer diameters of 100 mm and 120 mm respectively. The shaft rotates at 600 rpm and the maximum torque is 20% than the mean torque. Determine the safe power the shaft can transmit if permissible shear stress is 90 MPa and the maximum angle of twist is 3° for 2 m length. Take modulus of rigidity = 80 GPa	8 marks
4	A hollow shaft of diameter ratio 3/8 is to transmit 375 Kw power at 100 rpm. The maximum torque is 20% greater than mean torque. The shear stress is not to exceed than 60 N/mm^2 and twist in length of 4 m not to exceed 2°. Calculate its external and internal diameter which will satisfy both the above conditions. Assume modulus of rigidity as 0.85×10^5 N/mm^2.	8 marks
5	A hollow shaft having an internal diameter 40% of external diameter transmit 600kW at 150rpm.Determine the external diameter of the shaft if the shear stress is not to exceed 65mpa and the twist in a length of 3m should not exceed 1.4 degrees. Assume maximum torque=1.2 mean torque and modulus of rigidity =1 x 10^5 mpa.	8 marks

CHAPTER-2 B] STRAIN ENERGY AND IMPACT LOAD

SHORT TERM QUESTIONS

1	A steel rod 35 mm in diameter and 3.5 meter long subjected to axial pull of 125 kN. Find maximum instantaneous stress induced and elongation produced if load applied is i) gradually ii) suddenly. Take E= 220Gpa. Also comment on results.	6 marks

2	A steel bar 3m long and 2500mm^2 in area hangs vertically, which is securely fixed on a collar at its lower end. If a weight of 15kN falls on the collar from a height of 10mm, determine the stress developed in the bar what will be strain energy stored in the bar. E=200Gpa	5 marks
3	A uniform metal bar has a cross sectional area 700mm^2 and a length of 1.5m.If the stress at elastic limit is 160mpa.What will be the proof resilience? Determine also maximum value of an applied load which may be suddenly applied without exceeding elastic limit.	5 marks
4	Prove that $\sigma = \frac{P}{A}\left[1 + \sqrt{1 + \frac{2AhE}{PL}}\right]$ where,P= Load dropped, A = Cross sectional area, H= height through which load is dropped ,L= Length of rod, E= Young's modulus ,σ= Stress induced in the rod due to impact	5 marks
5	Define :i) Strain energy ii) Resilience iii) Proof resilience iv) Modulus of resilience	5 marks

LONG TERM QUESTIONS

1	A vertical bar of uniform cross sectional area 400mm^2 and 1.5m long is fixed at the tope end and is provided with circular disc at the bottom. If the weight of 500N falls on the disc from a height of 100mm, determine a maximum stress in the bar. Take E=200kN/mm^2.Also determine strain energy absorbed, modulus of resilience and maximum instantaneous elongation of the bar.	8 marks
2	A Wagon weighing 35 kN is attached to a wire rope and moving down an incline at a speed of 3.2 km/hr when the rope jams and the wagon is suddenly brought to rest. If the length of the rope is 66 m at the time of sudden stoppage. Calculate the maximum instantaneous stress and maximum instantaneous elongation produced. Diameter of rope = 32 mm, E = 200 GN/m^2.	8 marks
3	An unknown weight falls through 10mm on a collar rigidly attached to the lower end of a vertical bar 4m long and 65mm^2 in section. If maximum instantaneous extension is known to be 2mm.What is corresponding stress and the value of unknown weight? E=200Gpa	8 marks
4	A crane-chain whose sectional area is 6.26 cm^2 carries a load of 10 kN. As it is being lowered at a uniform rate of 40 m per minute, the chain gets jammed suddenly, at which time the length of the chain unwound is 10 m. Estimate the stress induced in the chain due to sudden stoppage. Neglect weight of chain. Take E = 210Gpa	8 marks
5	A crane-chain whose sectional area is 6.25 cm^2 carries a load of 10 kN. As it is being lowered at a uniform rate of 45 m per minute, the chain gets jammed suddenly, at which time the length of the chain unwound is 10 m. Estimate the stress induced in the chain due to sudden stoppage. Neglect weight of chain. Take E = 210Gpa	8 marks

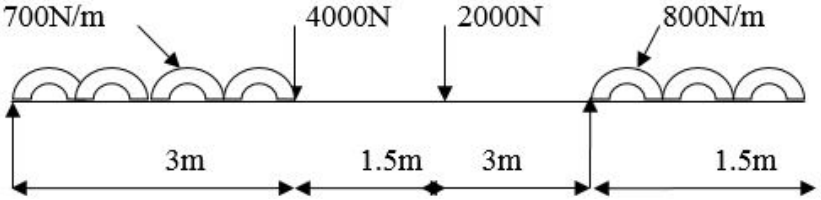
CHAPTER-3 SHEAR FORCE & BENDING MOMENT DIAGRAMS

SHORT TERM QUESTIONS

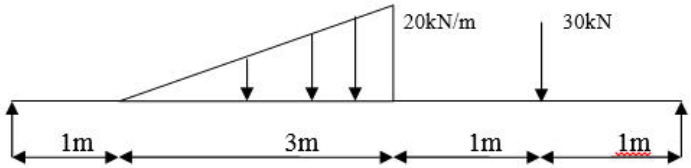
1	A cantilever of length 2 m carries a UDL of 2 kN/m length over the whole length and point load of 3 kN at the free end. Draw S.F.D. and B.M.D.	6 marks
2	Draw S.F.D. and B.M.D. for a simply supported beam carrying a UDL of 'w' per unit run over the whole span.	5 marks
3	Derive the relation between shear force and bending moment	6 marks
4	Draw SFD and BMD for a cantilever beam of length L with a point load W at free end.	5 marks
5	Show SFD and BMD for simply supported beam having certain length and subjected to point load 'W' at center.	5 marks

LONG TERM QUESTIONS

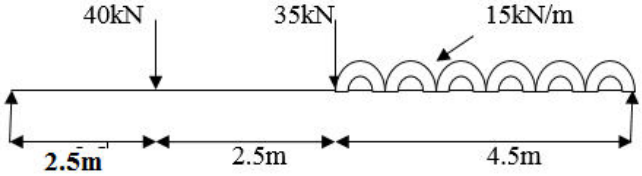
1	Draw shear force and bending moment diagrams for the beam as shown in figure. Indicate numerical values at all important section.	8 marks



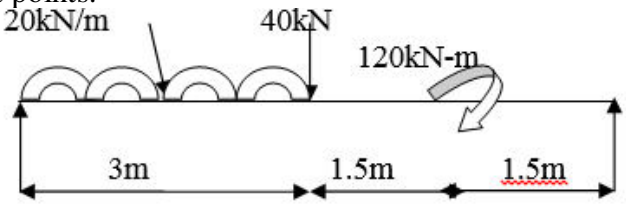
2	A 10m long beam is hinged at each end and carries a UDL of 1kN/m from left end up to the center. An anticlockwise couple of 15kN-m also acts at a distance of 2.5m from right end. Draw SF and BM diagrams for the beam showing all significant values	8 marks
3	Draw SF and BM diagrams for the simply supported beam as shown indicate all the important values	8 marks



4	A simply supported beam as shown in figure carries two concentrated loads and UDL. Draw SFD and BMD	8 marks



5	Draw SF and BM diagrams for the beam as shown in figure Mark all significant points.	8 marks



Section – II

CHAPTER-4 BENDING AND SHEAR STRESSES IN BEAM

SHORT TERM QUESTIONS

1	A beam cross section as shown in fig. determine maximum tensile and compressive stress when beam is subjected to UDL of 2 KN/M and length of span is 3m for cantilever beam resists bending moment about neutral axis	6 marks
2	A cantilever beam has length 2m. It is of T section with flange 100 x 15mm web 200 x10mm. Find maximum UDL per meter run that can be applied if maximum tensile stress not to exceed 25mpa.	6 marks
3	A circular pipe of external diameter 70mm and thickness 8mm used to simply supported beam over effective span of 2.5m.find maximum concentrated load that can be applied at center of span if permissible bending stress in the tube is 150mpa	6 marks
4	A timber beam of rectangular section is to support a load of 20kN uniformly distributed load over span of 3.6m when it is simply supported. If depth of cross-section is to be twice of breadth and bending stress not to exceed 7mpa. Determine dimensions of cross section	6 marks
5	The cross section of beam is inverted 'T' section flange and web size 60x20 and 20 x 60mm respectively subjected to vertical shear force of 12 kN. Find ratio of maximum shear stress to average shear stress	6 marks
6	A 'T' section 100 x100x12mm beam subjected to shear force of 20kN. Find maximum shear stress	6 marks
7	A hollow rectangular section 30 x 60mm inside dimension and 10mm thick is subjected to shear force of 40kN. Calculate ratio of maximum shear stress to average shear stress	6 marks

LONG TERM QUESTIONS

1	The SS beam of span 4 m carries a central point load of 100 KN. The beam is I section with top flange 200mm X 24 mm, web 24 mm X 150 mm, and bottom flange 24 mm X 100 mm. Calculate shear stress at different sections and draw shear stress distribution diagram.	8 marks
2	An I-girder has equal flanges 100x10mm, and web 160x10mm used over a simply supported beam span of 4m.Find intensity of UDL which beam can carry safely if allowable bending stress is 140mpa	8 marks
3	A beam of I section is cantilever supported over span 4M. Determine safe UDL, beam can carry per meter length if allowable maximum stress in beam is 32.82 MPa. Top Flange 60x20, Web = 100x20 bottom flange 100x20	8 marks
4	A beam of I-section 50cm deep and 20cm wide has equal flanges 2cm thick and web 1cm thick. It carries at a cross section a shear force of 220kN. Determine shear stress distribution in beam and ratio of maximum to mean shear stress	8 marks
5	An I section beam 340 x 200mm has web thickness of 10mm and flange thickness 20mm. It carries shear force of 10kN. Sketch shear stress distribution across section	8 marks
6	A beam of I-section 52cm deep and 22cm wide has equal flanges 2cm thick and web 1cm thick. It carries at a cross section a shear force of 200kN. Determine shear stress distribution in beam and ratio of maximum to mean shear stress	8 marks
7	The cross section of beam is inverted 'T' section flange and web size 60x20 and 20 x 60mm respectively subjected to vertical shear force of 12 kN. Find ratio of maximum shear stress to average shear stress	8 marks
8	A simply supported beam carried UDL of 350kN/m over entire span of 1meter. The cross section of beam having flange 150 x 30mm and web 170 x 30mm thick. Calculate maximum shear stress	8 marks

CHAPTER-5 SLOPE AND DEFLECTIONS OF BEAM

SHORT TERM QUESTIONS

1 A simply supported beam 5.2 m long carries a point load of 11kN at its midpoint. Calculate slope and deflection by double integration method only. E=2.1×10^5 mpa, I=1.1×104 mm^4. 5 marks

2 The simply supported beam of span 4.5 m is carrying a UDL of 3.8 KN/m over the entire span. Find maximum deflection and slope of the beam. Take EI = 80×10^{10} N.mm^2. 6 marks

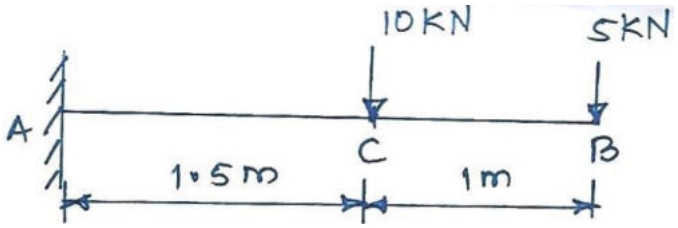
3 Describe the terms slope and deflection of beam. 4 marks

4 A simply supported beam of 6.5 m span is subjected to a central concentrated load of 100 kN. Calculate the maximum slope and maximum deflection. Take E = 200 Gpa, I = 15 × 10^6 mm^4. 6 marks

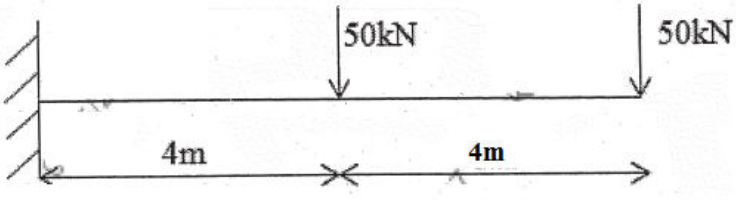
5 A simply supported beam of span 8 meter carries UDL of 14 kN/m run over entire spa. The cross section of beam is 165 x 210 mm deep. Calculate the slope at support and maximum deflection E=18Gpa 6 marks

LONG TERM QUESTIONS

1 Determine the slope and deflection at free end of cantilever as shown in figure by Moment area method EI=4000 KN.m^2. 8 marks



2 Use moment area method to determine slope and deflection at the free end of a cantilever loaded as shown in figure. The cross section of beam is a rectangle of 220 mm wide and 320 mm deep. Take E = 200 Gpa 8 marks



3 A cantilever 3.2 m long carries two point loads of 11 kN each acting at the free end and at the center. If E = 120 GPa and I = 2 x10^8 mm^4, determine the maximum slope and deflection using Moment-Area method. 8 marks

4 Use moment area method to determine slope and deflection at the free end of a cantilever loaded beam. A beam is 6.5 meter long carries point load of 25 kN at free end and another point load of 15 kN at a distance of 2.5 meter 8 marks

from fixed end. The cross section of beam is a rectangle of 120 mm wide and 220 mm deep. Take E = 210 Gpa.

5 A beam of uniform rectangular section 125 x 275mm is simply supported at ends. It carries uniformly distributed load of 6.5 kN/m over entire span of 4 meter. Find a) slope of support b) Maximum deflection E=15 Gpa 8 marks

CHAPTER-6 PRINCIPAL STRESSES AND STRAINS

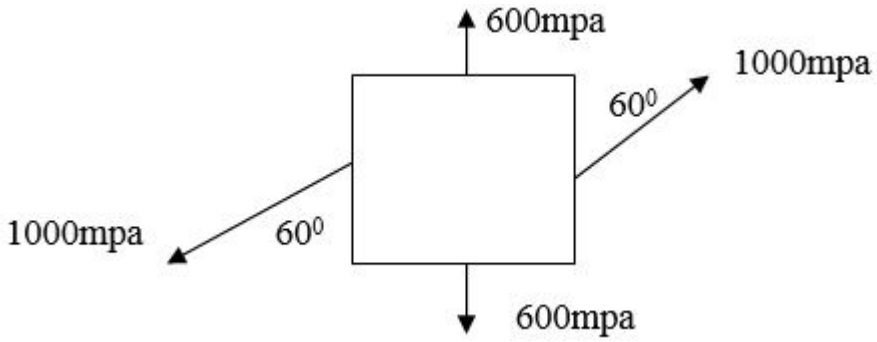
SHORT TERM QUESTIONS

1 At element in a strained body is subjected to a tensile stress of 140mpa and a shear stress of 55mpa tending to rotate the element in a anticlockwise direction find: 5 marks

i) Magnitude of normal and shear stresses on a section inclined at 40^0 with the tensile stress.

ii) The magnitude and direction of maximum shear stress

2 A specimen subjected to stress as shown in figure Calculate the major and minor principal stresses, angle of principal planes and the maximum shear stress. 6 marks



3 A plane element in a body is subjted to atensile stress of 110mpa accompanied by a shear stress of 26mpa Find: 6 marks

i)The normal and shear stress on a plane inclined at an angle of 25^0 With the tensile stress

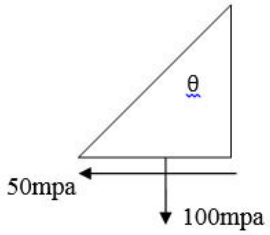
ii) The maximum shear stress on the plane

4 Derive the expression for the major and minor principal stresses and the maximum shear stress when a body is subjected to the direct stresses in two mutually perpendicular planes. 6 marks

5 Describe procedure of Mohr's circle graphical technique 4 marks

6 What do you mean by Principal planes, principal stresses and maximum shear stress? state the expression for them. 4 marks

7 The stresses on two perpendicular planes are as shown in fig. Determine the position of plane AS such that the shear stress on it is zero. What will be the normal stress on it ? 6 marks



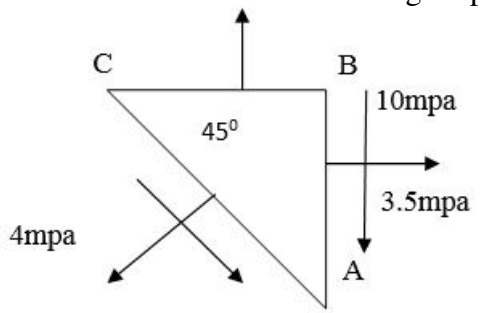
8 Explain in brief the following terms and state the required expressions. 4 marks

i) Maximum principal strain

ii) Minimum principal strain

LONG TERM QUESTIONS

1 At a point in a stressed body. The state of stress on two planes 45° apart is as shown in fig. Determine the tensile stress acting on plane BC. 8 marks

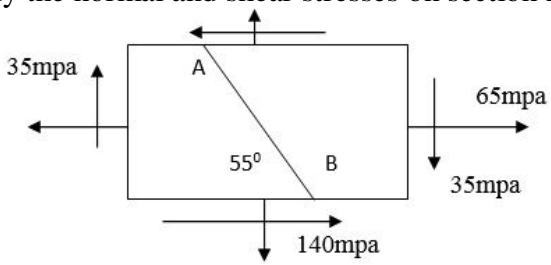


2 Direct stresses of 125 MPa (tensile) and 95 MPa (compressive) exist on two perpendicular planes at a certain point in a body. They are also accompanied by shear stress on the planes. The major principal stress at the point due to these is 145 MPa. Find (i) shear stress on these planes (ii) maximum shear stress. 8 marks

3 A plane element in a cylindrical pipe line is subjected to tensile stress of 420Mpa on one plane along X-axis and 170Mpa on the other at right angle to former (Y-axis). Each of above stresses is accompanied by a shear stress of 90 Mpa such that when associated with Major tensile stress tends to rotate the element in anti-clock wise direction Find a) Principal stresses and their directions b) Maximum shearing stress and directions of planes on which may act. 8 marks

4 At a point in a strained material, the principal stresses are 175 MPa and 65 MPa respectively. Both stresses are tensile in nature. The plane inclined at 25° with major principal plane. Find normal, tangential and resultant stress on this plane along with angle of obliquity by using Mohr's circle method only. 8 marks

5 A point in a strained material is subjetced to stresses as shown in figure. Find graphically the normal and shear stresses on section AB 8 marks



6 Direct stresses of 135 MPa (tensile) and 85 MPa (compressive) exist on two perpendicular planes at a certain point in a body. They are also accompanied by shear stress on the planes. The major principal stress at the point due to these is 142 MPa. Find (i) shear stress on these planes (ii) maximum shear stress. 8 marks

DATA SCIENCE TYBTech

Question Bank

4 marks questions

1. What is Data Science? Explain any 5 components of Data science.
2. Compare Data, information, and knowledge with examples.
3. What do you mean by Data analysis? Explain descriptive, predictive, and prescriptive types of data analytics.
4. What is big data, describe the source of big data?
5. What do you mean by 3V's of big data?
6. Explain the applications of data science?
7. Describe Web Scrapping, along with its advantages?
8. Explain the process of web scrapping with neat diagram.
9. Why data visualization is important in data analytics?
10. What is python matplotlib? What is its use?
11. Explain the types of plots created using matplotlib.
12. Explain the different components used in the matplotlib.pyplot for data visualization?
13. Explain why and how to use the following functions in matplotlib.pyplot?
14. Explain the importance of data preprocessing in data science?
15. Explain the steps involved in data preprocessing?
16. What is rescaling? Why is it needed .explain the two methods of feature rescaling?
17. What do you mean by stemming in NLP?
18. Explain the applications of NLP?
19. Write a short note on NLTK.
20. Describe the various functionality in NLTK.
21. Applications of Linear Algebra in data science.

22. What is Statistic? Explain types of statistic.
23. Explain the Measure of Central tendency.
24. Define Machine Learning. Also describe the need of ML?
25. What are the various applications of Machine Learning?
26. What is unsupervised learning explain with example.
27. What is supervised learning explain with example.
28. Explain clustering & association mining with examples.
29. Write a short note on Deep Learning.
30. Write a short note on Simpson's Paradox with example.

8 marks questions

1. What is Naïve Bayes classifier? Also explain its advantages and disadvantages.
2. Explain Bayes therom
3. Write steps involve in KNN algorithm. Explain with example.
4. What is Support vector machine? How it works?
5. Elaborate the concept of overfitting & underfitting?
6. What is scikit learn. Explain its importance in data science?
7. What is NumPy. Explain various applications on the NumPy array.
8. Differentiate between supervised unsupervised & reinforcement learning?
9. What do you mean by regularization? Explain its types.
10. Describe Random forest classifier and its applications.
11. Define Time Series. What are the applications of Time series?
12. What is Neural Networks? Describe the types of Neural Networks.
13. Elaborate the concept of Deep Learning.
14. How Decision Tree works, explain with suitable example.
15. Explain advantages and disadvantages of Decision Tree classifier.

16. What do you mean by Gini Index in Decision Tree?
17. What is Information gain in Decision Tree?
18. Explain clustering & association mining with examples.
19. Why Linear Algebra required in Data Science?
20. What is Statistic? Explain types of statistic.
21. Explain KNN algorithm with suitable example.

DATA SCIENCE TYBTech

Question Bank

4 marks questions

1. What is Data Science? Explain any 5 components of Data science.
2. Compare Data, information, and knowledge with examples.
3. What do you mean by Data analysis? Explain descriptive, predictive, and prescriptive types of data analytics.
4. What is big data, describe the source of big data?
5. What do you mean by 3V's of big data?
6. Explain the applications of data science?
7. Describe Web Scrapping, along with its advantages?
8. Explain the process of web scrapping with neat diagram.
9. Why data visualization is important in data analytics?
10. What is python matplotlib? What is its use?
11. Explain the types of plots created using matplotlib.
12. Explain the different components used in the matplotlib.pyplot for data visualization?
13. Explain why and how to use the following functions in matplotlib.pyplot?
14. Explain the importance of data preprocessing in data science?
15. Explain the steps involved in data preprocessing?
16. What is rescaling? Why is it needed .explain the two methods of feature rescaling?
17. What do you mean by stemming in NLP?
18. Explain the applications of NLP?
19. Write a short note on NLTK.
20. Describe the various functionality in NLTK.
21. Applications of Linear Algebra in data science.

22. What is Statistic? Explain types of statistic.
23. Explain the Measure of Central tendency.
24. Define Machine Learning. Also describe the need of ML?
25. What are the various applications of Machine Learning?
26. What is unsupervised learning explain with example.
27. What is supervised learning explain with example.
28. Explain clustering & association mining with examples.
29. Write a short note on Deep Learning.
30. Write a short note on Simpson's Paradox with example.

8 marks questions

1. What is Naïve Bayes classifier? Also explain its advantages and disadvantages.
2. Explain Bayes therom
3. Write steps involve in KNN algorithm. Explain with example.
4. What is Support vector machine? How it works?
5. Elaborate the concept of overfitting & underfitting?
6. What is scikit learn. Explain its importance in data science?
7. What is NumPy. Explain various applications on the NumPy array.
8. Differentiate between supervised unsupervised & reinforcement learning?
9. What do you mean by regularization? Explain its types.
10. Describe Random forest classifier and its applications.
11. Define Time Series. What are the applications of Time series?
12. What is Neural Networks? Describe the types of Neural Networks.
13. Elaborate the concept of Deep Learning.
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20. What is Statistic? Explain types of statistic.
21. Explain KNN algorithm with suitable example.

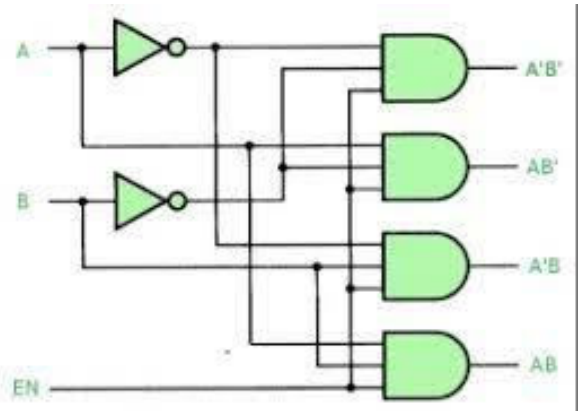
Class: T.Y. BTech (E&TC) (Part –I) (CGPA)
w.e.f. June 2020
Subject: Digital Design and HDL

Sample question bank

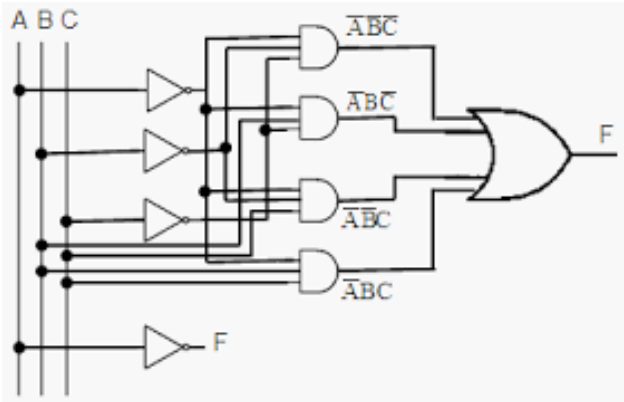
Note: The questions are for reference only.

Section I

1) What are steps involved in VLSI design flow.
2) Explain the difference between the simulation and synthesis process of VLSI design flow.
3) With example explain the syntax of entity and architecture of VLSI design flow.
4) Write the VHDL code and draw the simulation waveforms for the combinational circuit given below.



5) Write the VHDL code using structural modeling using AND gate as component and draw the simulation waveforms for the combinational circuit given below.



6) What are different data types used in VHDL? Explain any four with example.
7) What are different types of operators used in VHDL.
8) Design a VHDL module for 4:1 mux, using if – else statement ?
9) Design a VHDL module for full adder using data flow architecture style ?

10) Explain the concept of operator overloading with the help of example.

11) With example explain the attributes

(i) A' left (n) (ii) S'event (iii) S'active (iv) A'range(n)

12) What are different architecture styles? Explain each of them using one example.

13) Design a VDHL module for 3:8 decoder, using dataflow model and behavioral model. Analyze the design and comment on the performance of both the systems.

14) With an example, explain the syntax of package declaration and package body in VHDL.

15) State difference between signal, variable and constant.

16) What are different concurrent statements used in VHDL? Explain with example.

17) What are different sequential statements used in VHDL? Explain with example.

18) With the help of example and waveform, explain the difference between inertial delay and transport delay.

19) What are different wait statements used in VHDL?

20) What is the significance of generic statement in VHDL.

21) With an example, explain the syntax of for-generate statement.

22) Compare functions and procedures.

23) Design a VHDL module for full adder using half adder as component.

24) Design a VHDL module for a 4:2 encoder using case statement.

25) Design a VHDL module for a 4 bit adder using for-generate statement.

26) Design a VHDL module for mod 5 up counter using synchronous reset.

27) Design a VHDL module for mod 10 down counter using asynchronous reset.

28) Design a VHDL module for 4 bit binary up counter using synchronous set/reset.

29) Design a VHDL module for J-K flip flop.

30) Design a VHDL module to implement 8 x 8 RAM ?

31) Design a VHDL module to implement 8 x 8 ROM ?

32) With an example, explain the different types of modules in Verilog HDL.

33) Design a Verilog module for 2 bit comparator.

34) Design a Verilog module for 1 : 4 demultiplexer.

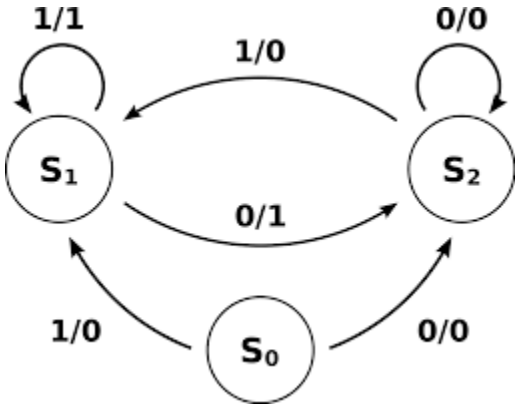
35) What are different data types used in Verilog HDL? Explain with example.

36) Design a Verilog module for half adder and full adder.

Section II

1) Differentiate between Moore and Mealy model of FSM.
2) Draw the state diagram, write the truth table and design a VHDL module for JK flip flop.
3) Draw the state diagram, write the truth table and design a VHDL module for T flip flop.
4) Design a sequence detector using Moore machine to detect a sequence 1101.
5) Design a sequence detector using Mealy machine to detect a sequence 101.
6) Design a sequence detector to detect 110 using Moore and Mealy model. Analyze the difference.
7) With the help of block diagram, state diagram, explain the working of Add and Shift multiplier.
8) Draw state diagram and Design a VHDL module for Add and Shift multiplier.
9) Draw state diagram and Design a VHDL module for traffic light controller. Explain its working.
10) Draw state diagram and Design a VHDL module for Coffee Vending machine.
11) Explain in detail, stuck - at- fault test. What do you mean by stuck – at- 0 and stuck-at-1 error.
12) Write a short note on Testing of Combinational logic
13) Write a short note on Testing of Sequential logic.
14) Write a short note on Built – in- self test
15) Write a short note on Boundary scan test.
16) Design a test bench for 3: 8 decoder using VDHL.
17) Design a 4:1 multiplexer and its test bench using VHDL module.
18) With the help of block diagram explain CPLD architecture.
19) Compare CPLD and FPGA.
20) What are different types of FPGA architectures? Explain in detail.
21) With the help of diagram explain the working of a macrocell.
22) Explain the structure of Embedded Array block of Flex 10K.
23) Explain the architecture of XC 9500 CPLD IC.
24) What are different types of PLDs.
25) With the help of block diagram explain the working of Product Allocator block in CPLD.
26) What are interconnect matrix.
27) What is ASIC? Explain ASIC design flow.
28) Write a note on system on chip (SOC) architecture. State its significance.

29) Write state table and Design a VHDL module for the state diagram given below.



30) Draw the state diagram and design a VHDL module for 2 bit binary counter.

Exam Question Bank

Class: T.Y.BTech(E&TC)-II **Subject: Embedded Systems**

Q. 1. Attempt any four questions. (4x4=16)

1. Define embedded system. Explain its characteristics.
2. Explain embedded system design challenges.
3. Explain revenue loss in time to market design metrics
4. Write different features of LPC2148.
5. Explain concept of three stage pipe line of ARM 7 processor.
6. Explain bus architecture in ARM7.
7. Explain recent trends in embedded system.
8. Explain with block diagram HW/SW design process for embedded system.
9. Write different features of ARM 7 microprocessor.
10. Explain the concept of PLL in LPC2148.
11. Explain the concept of RTC in LPC2148.
12. Explain the concept of watchdog timer for LPC2148.
13. Explain the concept of DAC for LPC2148.
14. Explain the concept of PWM for LPC2148.
15. Explain the concept of USB for LPC2148.

Q. 2. Attempt any two questions. (6x2=12)

1. Draw and explain the data flow model of ARM core.
2. What are operating modes of ARM7 processor and draw the CPSR format.
3. Explain the concept of following peripherals in LPC2148.
   a) Timer/Counter
   b) ADC
4. Explain the following
   a) Characteristics of embedded system.
   b) Applications of embedded system.
5. Describe the operation with example of following ARM instructions.
   a) MVN b) LSL c) ADD d) ORR e)CMN
6. Describe the operation with example of following ARM instructions.
   a) LDR b)MOV c) BX d)MLA e)SUB
7. Draw and explain CPSR/SPSR format.
8. Explain Memory map for LPC 2148
9. List and elaborate the privileged and non-privileged modes of operation in ARM 7 processor.

Q. 3. Attempt any four questions. **(4x4=16)**

1. Write different features of RTOS.
2. Explain concept of semaphore with example
3. Draw and explain architecture of kernel.
4. Explain task states associated with RTOS.
5. Explain embedded system used in digital camera.
6. Draw and explain the block diagram of Smart Card System based ATM.
7. Explain Mobile Internet device.
8. Define interrupt latency, interrupt response time and interrupt recovery time.
9. Write different features of µ cos II RTOS.
10. Explain concept of mailbox and message queues in RTOS.
11. Explain concept of pipes, events and timers in RTOS.
12. Difference between micro kernel and monolithic kernel architecture.
13. Explain Task states associated with micro C/OS II.
14. Interface Buzzer to any port pin of LPC2148. Write an embedded C program to on/off buzzer continuously after some delay.
15. Draw Interfacing diagram of Relay to LPC2148 and write an embedded C program to change relay switch from NO to NC.
16. Draw interfacing diagram of DC motor with LPC2148 .Write an embedded c program to rotate DC in clockwise direction.

Q. 4. Attempt any two questions. **(6x2=12)**

1. Explain the following kernel objects in RTOS.
   a) Mailbox b) Message Queue
2. What are the types of scheduling algorithm .Explain any two types of scheduling algorithm in RTOS.
3. Interface LED to any port pin of LPC2148. Write an embedded C program to blink LED continuously after some delay.
4. Explain kernel services in RTOS.
5. Explain the concept of all kernel object in RTOS.
6. What are the types of scheduling algorithm .Explain the concepts of round time slicing scheduling method for RTOS.
7. Draw interfacing diagram of 7 segment with LPC2148 .Write an embedded c program to display 0 to 9 number on 7 segment.
8. Interface a stepper motor with LPC2148 for the following specification.
   i. The motor is connected to port pins P0.4,P0.5,P0.6,P0.7
   ii. Rotate motor in clockwise direction

   Draw a neat circuit diagram and an embedded C program.
9. Draw interfacing diagram of 16x2 LCD with LPC2148 .Write an embedded c program to display "Embedded Systems" message on 16x2 LCD.
10. Draw interfacing diagram of keypad with LPC2148 .Write an embedded c program to display numbers on 7 segment /LCD when key is pressed.
11. Interface 8 LED's to LPC2148 port pins P0.2 to P0.9. Write an embedded C program to blink them alternately with a neat circuit diagram.
12. Interface switch to P0.0 pin and LED to P1.0 pin of LPC2148. Write an embedded C program to turn ON LED when switch is pressed.

TYBTech (Electronics & Telecommunication)(Part-II) wef June 2020
Question Bank
Subject: Electronic System Design

Q.1 Short Answer

1. Explain working principle and VI characteristics of SCR.
2. Explain Two transistor analogy of SCR. Also derive the expression for anode current.
3. Explain construction and working of TRIAC.
4. Explain complementary commutation method of turning OFF of SCR
5. Explain AC power control using DIAC and TRIAC.
6. Explain working Principle and construction of DIAC.
7. What will happen if inductor is replaced by resistor in Class D commutation circuit?
8. Explain VI characteristics of DIAC.
9. What do you mean by commutation of SCR? Explain Class B commutation of SCR.
10. What do you mean by commutation of SCR? Explain Class C commutation of SCR.
11. What do you mean by commutation of SCR? Explain Class D commutation of SCR.
12. What do you mean by commutation of SCR? Explain Class D commutation of SCR
13. Explain with neat circuit diagram AC power control using TRIAC in Fan Regulator.
14. Explain with circuit diagram the AM modulator using IC1596.
15. Draw and explain block diagram of IC74C926.
16. Explain the effect of freewheeling diode on single phase half wave converter with RL load
17. Draw block diagram of Event counting and design 2-digit event counting
18. Explain working principle of Balanced Modulator.
19. Explain FSK demodulator using PLL565
20. Draw and explain block diagram of IC 74C926.
21. Compare Thermocouple and RTD.
22. Explain different temperature sensors used in industry.
23. Draw and explain architecture of PLC.
24. Explain applications of PLC.
25. Compare PLC and Relay logic.
26. Design V to I converter to convert input voltage -2.5V to 2.5V into 4-20mA
27. Design a circuit to convert 0V to 0.5V into 0V to 5V
28. Explain J and K type thermocouple.
29. Define the following terms associated with SCR a) forward breakover voltage b) Peak reverse voltage
30. Define the following terms associated with SCR a) Latching Current b) Holding current
31. Draw construction diagram of TRIAC and explain its operation.
32. Describe the difference between SCR and BJT
33. Draw and explain block diagram of IC74926.
34. Design V to I converter to convert 0-5V into 4-20mA
35. Design current to voltage converter (floating load) for converting 4mA to 20mA to 0-5V
36. Explain cold junction compensation in thermocouple.
37. Draw block diagram of Event counting and explain its working.
38. Explain importance of V to I & I to V converter with relative diagram

39. Design zero span circuit to convert input voltage of -2.5V to 2.5V into 0V to 10V
40. Draw and Explain PLC architecture.

Q.2 Long Answer

Unit 1:

1. Explain with the help of circuit diagram and waveforms single phase full wave controlled rectifier (Mid-point converter) with resistive load. Derive the expression for
   a) Average DC output voltage
   b) Average DC load current
   c) RMS load voltage

4. Compare Class A, B, C, D commutation in SCR with circuit diagram, output waveform and necessary parameters.

Unit 2:

5.Draw and explain working of fully controlled bridge rectifier with RL and R load.

6. Explain with the help of circuit diagram and waveforms single phase full wave controlled rectifier (Mid-point converter) with resistive load. Derive the expression for Average DC output voltage,Average DC load current, RMS load voltage
7. Draw and explain working of single phase half wave controlled rectifier with inductive load.

Unit 3:

8. Draw internal block diagram of 565, explain its working. How PLL is suitable for frequency synthesis.
9. For a free running frequency of 500KHz. Determine value of fL, Fc & VCO, external resistor and capacitor.
10. Design frequency synthesizer to generate signal of 1KHz to 999KHz using PLL565.
11. Design a frequency synthesizer to generate a frequency of 1KHz to 999.9KHz using PLL 565.
12. Design a frequency synthesizer using PLL 565 to obtain 100KHz frequency signal using 50Hz AC mains as input.

Unit 4:

13. Design a DVM for measurement of 4V input voltage. Explain its working.
14. Design a DVM for measurement of 2V input voltage.
15. Design auto ranging circuit for DVM with 2 to 2000V input voltage and 1MHz crystal frequency.
16. Design $3^{1/2}$ digit DVM for measurement of voltage in the range of 2V to 200V.
17. Design a frequency measurement system to measure a frequency up to 10KHz with 0.1Hz resolution use IC74C926.
18. Design frequency ratio measurement system to measure ratio upto 1000. Use IC74C926
19. Design frequency ratio measurement setup to count frequency ratio upto 1KHz with 0.1Hz resolution using IC74926.
20. Design two-digit display for event counting using IC74926.
21. Design time period measurement set up to measure low frequency of 50Hz with 0.1Hz resolution.
22. Design frequency measurement set up to measure frequency upto 10MHz with 0.1Hz resolution. Use IC74C926.

23. Design a timer to generate 175sec delay using XR2240.

Unit 5:

24. Differentiate between V to V, I to V and V to I converters.

Unit 6:

25. Draw and explain ladder diagram for elevator system.
26. Compare ON-OFF & Proportional controller.
27. Draw and explain ladder diagram for bottle filling plant system
28. Design an analog ON-OFF controller for the temperature range of 0˚C-500˚C set point must be adjustable between 200˚C to 300˚C with dead band of 10%. Use thermocouple as temperature sensor.
29. Design ON-OFF temperature controller with dead band, temperature range, 110˚C to 138˚C, set point is settled from 115˚C to 122˚C. Sensitivity is 1mV/˚C and dead band is +/-115˚C
30. Design proportional temperature controller for 50˚C to 280˚C. P.B is 28% with full scale output of 9.5V the setting is done at 87˚C with zero error output of 38%. Controller & sensors are remotely located.
31. Design a proportional controller for following specifications:
    Input temperature range: 0˚C to 150˚C
    Proportional band = 30%
    Full scale output = 10V
    Set point = 80˚C , Zero error output = 50%
32. Design a proportional controller to control pressure in the range of 2psi to 15psi, for set point of 10psi, proportional band-25%. Assume the sensitivity is 10mV/psi
33. Design process control system for 1.5PSI- 28PSI which is converted into 4mA to 20mA. Set point is 12.8PSI, proportional band is 48% zero error control output is 29% output should be converted from 4mA to 20mA to 0 to 10V.
34. Design an ON-OFF temperature controller for temperature range of 0˚C to 500˚C. Set point must be adjustable between 200˚C to 300˚C with dead band 10˚C. Use J-type thermocouple.

Total No. of pages: 3

B.Tech. (Information Technology)

Class : Third Year **Subject: Elective-I: Data Science**

- **Short answer Questions**
  1. Find rank of given matrix.
  2. Find Determinant of matrix.
  3. Find Inverse of matrix.
  4. Find the probability for given data.
  5. Find the standard deviation for given data.
  6. Categorize given variables into various types.
  7. Explain Simpson's Paradox and Central Limit Theorem.
  8. Explain correlation, causation.
  9. Give the examples of independent, dependent and exclusive events.
  10. What is random variable and its sample space.
  11. Explain Bay's Theorem.
  12. Calculate conditional probability.
  13. Find Frequency table for given column, two-way table for the two columns with and without normalization after dropping null values.
  14. Consider above data table and output for the following
      a. Find Number of records and attributes
      b. Find Unique values for every attribute
      c. Find histogram using any attribute(s).
  15. Find Joint probability and Marginal Probability for given data
  16. What is web scrapping? Explain types of web scrappers.
  17. What is Bigdata. Explain properties of bigdata.
  18. Explain various terms w.r.t Support Vector Machine.
  19. Explain types of machine learning.
  20. Give examples of machine learning for various types.
  21. Explain working of decision tree algorithm.
  22. What is regression? Explain various types of regression.
  23. What is classification? Explain algorithm used for classification.
  24. Explain working of naïve bayes algorithm.
  25. Explain Neural network.
  26. Explain terms training data, testing data, overfitting, underfitting.
  27. Explain working of KNN algorithm.
  28. Explain Supervised learning and its various algorithms.
  29. Explain Unsupervised learning and its types.
  30. Explain Reinforcement learning and its types.
  31. Give measures of classification.
  32. Explain logistic regression.
  33. Explain Terms AI, Machine Learning and deep learning.

34. Explain working of random forest algorithm.
35. Explain terms bias and variance.
36. Explain Ridge Regression and Lasso regression.
37. Explain Regularization.
38. Explain probability mass function, probability distribution function, normal probability distribution
39. Explain central tendencies and dispersion of data
40. Explain True positive, False positive, True Negative, False Negative with example.

- **Long answer Questions**

1 Find mode, mean, median, range and quantile for given data.
2 Find correlation between two variables.
3 Find sample space and probability for given x .
4 Calculate
   a. product of matrix A and vector X
   b. product of Vector X and Vector Y
   c. addition of Vector X and Vector Y
5. Predict class of given instance using KNN algorithm.
6. Predict class of given instance using Naïve Bays algorithm.
7. Which of the attributes would you select as the root in a decision tree with multi-way splits using the entropy measure?
8. For the given confusion matrix, compute accuracy, recall, precision and F2-score.
9. Explain logistic regression and its types.
10. Calculate entropy for given data.
11. What is SVM? Explain types of SVM.
12. Compare types of machine learning.
13. Find probability using Bay's theorem.
14. Find relation and its trend between two variables.
15. How data is visualized using different charts. Give example of each.
16. What is time series data? Explain types of time series data.
17. What is dimensionality reduction? Explain techniques of dimensionality reduction.
18. What is hypothesis testing? Explain steps involved in it.
19. Given data define null hypothesis and alternate hypothesis. State whether null hypothesis accepted or rejected.
20. Explain how multiclass classification is carried out using SVM.

Question Bank

Subject-Civil
(Waste Water Engineering and Air Pollution) for Class-B Tech III Sem V
(w.e.f.June.2020) CBCS

1.	Explain process of ASP in waste water treatment plant with neat diagram. (5 marks)
2.	Explain Tricking filter in waste water treatment plant with neat diagram. (5 marks)
3.	The BOD of a sewage incubated for one day at 27°C has been found to be 120 mg/L. What will be the 5- day 20°C BOD. Assume K = 0.12 (Base 10) at 20°C. (5 marks)
4.	5 mL of raw sewage was diluted by specially prepared water, in a capacity bottle. The DO concentration of the diluted sample at the test was 9 mg/L and 6 mg/L after 5- day incubation at 20°C. Find the BOD of raw sewage. (5 marks)
5.	Explain dry weather flow with a neat diagram. Explain various factors affecting dry weather flow. (5 marks)
6.	Determine the size of circular sewer for discharge of 900 lit/sec running 75% of cross section area of sewer. Assume S= 0.0001 an N= 0.012. (6 marks)
7.	A town has a population of 1,50,000 persons with per capita water supply of 200 litres/day. Assuming 85% of water usage is appears to be sewage, design a sewer running half full at maximum discharge. Take a constant value of $N = 0.013$ at all depths of flow. The sewer is to be laid at a slope of 1 in 500. Take a peak factor of 3. (6 marks)
8.	Write a note on stabilization pond. (5 marks)
9.	Explain the function of each treatment zone of domestic sewage treatment plant using flow diagram. (5 marks)
10.	Discuss methodology of aerated lagoons with a neat diagram. (5 marks)
11.	Design High rate trickling filter for the following data- (8 marks) i. Sewage flow – 10 MLD ii. Recirculation ratio – 1:4 iii. BOD of raw sewage – 320 mg/L iv. BOD removal in PST- 35% v. BOD in final effluent – 40 mg/L
12.	Design continuous flow completely stirred ASP with following data- (8 marks) i. Wastewater discharge – 6000 m^3/d ii. Standard BOD of influent – 350 mg/L iii. Effluent BOD – 20 mg/L iv. MLSS – 2700 mg/L v. Sludge age – 10 days vi. Y – 0.65 vii. K_d – 0.05
13.	Write short note on anaerobic process with a neat sketch. (5 marks)
14.	Write short note on aerobic process with a typical sketch. (5 marks)
15.	Explain Sequential Batch Reactor (SBR) in treatment of domestic wastewater with a neat diagram. (5 marks)
16.	Write a short note on Algal Bacterial symbiosis with a neat sketch. (5 marks)
17.	Draw and explain septic tank in detail. (5 marks)
18.	Differentiate between conservancy system and water carriage system. (5 marks)
19.	Explain grit chamber in WWTP with a neat diagram. Enlist design criteria of the same. (5 marks)

Subject-Civil
(Waste Water Engineering and Air Pollution) for Class-B Tech III Sem V (w.e.f.June.2020) CBCS

<table>
<tr><td>20.</td><td>Enlist and discuss various types of sludge disposal. (5 marks)</td></tr>
<tr><td>21.</td><td>Explain ‘self-purification’ of stream in detail. (5 marks)</td></tr>
<tr><td>22.</td><td>A stream, saturated with DO has flow of 1.5 m^3/s, BOD of 6 mg/L and rate constant of 0.3 per day. It receives an effluent discharge of 0.25 m^3/s. Having BOD 20 mg/L, DO 5 mg/L and rate constant 0.13 per day. The average velocity of flow of the stream is 0.15 m/s. Calculate the DO deficit at point 20 km & 40 km downstream. Assume that the temperature is 20 °C throughout and BOD is measured at 5 days. Take saturation DO at 20 °C as 9.17 mg/L. (6 marks)</td></tr>
<tr><td>23.</td><td>Explain methodology adopted in constructed wetlands with the help of diagram. (5 marks)</td></tr>
<tr><td>24.</td><td>List and explain different composting methods. (5 marks)</td></tr>
<tr><td>25.</td><td>Enlist and explain various primary and secondary air pollutants. (5 marks)</td></tr>
<tr><td>26.</td><td>Using the following data ,find out DO at the end of 2 & 3 days, (6 marks)
<table>
<tr><th>Parameters</th><th>River</th><th>Waste water</th></tr>
<tr><td>Flow (m^3/s)</td><td>35</td><td>2</td></tr>
<tr><td>DO (mg/L)</td><td>9.2</td><td>0</td></tr>
<tr><td>5 day BOD (mg/L)</td><td>3</td><td>220</td></tr>
</table>
Take deoxygenation constant, as 0.10 per day & re-oxygenation constant as 0.30 per day. Take saturation DO as 10.4 mg/L.</td></tr>
<tr><td>27.</td><td>Explain bag filters with neat diagram. (5 marks)</td></tr>
<tr><td>28.</td><td>Explain electrostatic precipitators with a neat diagram. (5 marks)</td></tr>
<tr><td>29.</td><td>Explain incineration process of solid waste in detail. (5 marks)</td></tr>
<tr><td>30.</td><td>Enlist and explain various factors responsible for the rate of solid waste generation. (5 marks)</td></tr>
<tr><td>31.</td><td>Explain any four characteristics of ‘hazardous waste’ as per CPCB guidelines. (5 marks)</td></tr>
<tr><td>32.</td><td>Explain landfill solid waste disposal. (5 marks)</td></tr>
<tr><td>33.</td><td>Write a note on classification of solid wastes based on various types. (5 marks)</td></tr>
<tr><td>34.</td><td>Explain cyclone precipitator with a neat diagram. (5 marks)</td></tr>
<tr><td>35.</td><td>Explain 4Rs of solid waste management. (5 marks)</td></tr>
<tr><td>36.</td><td>Discuss Decentralized treatment systems for water treatment. (5 marks)</td></tr>
<tr><td>37.</td><td>Analyze various factors related to Ozone depletion. (5 marks)</td></tr>
<tr><td>38.</td><td>Explain in detail on Streeter Phelps’s Equation. (5 marks)</td></tr>
<tr><td>39.</td><td>Discuss Vermicomposting method with a neat diagram. (5 marks)</td></tr>
<tr><td>40.</td><td>Enlist important Air quality standards as per CPCB. (5 marks)</td></tr>
</table>

Unit.1:Hydrology and Precipitation

Q. No. **Statement**

1 Define Hydrology and discuss critically the statement "Through knowledge of hydrology is a must for any water resources planning"?

2 What is "hydraulic cycle" and what is its importance?

3 Explain as to how weather affects precipitation, and precipitation in turn affects the design of water resources projects.

4 Define precipitation, what are the different forms of precipitation?Or
What are the different forms of precipitation? Explain in brief.

5 Explain with sketch Thiessen's method for calculating average depth of Precipitation over an area. Discuss the relative merits of this method over other methods of computation.

6 The isohyets for annual-rainfall over a catchment were drawn. The areas of strips between the isohyets are indicated below. Find the average depth of annual precipitation over the basin.

Isohyets (cm)	Area between Isohyets (sq.km.)
9-10	22
10-11	80
11-12	105
12-13	98
13-14	78
14-15	16

7 What is meant by rain gauge density? What are the standards prescribed for it for different regions?

8 How would you determine statistically, the optimum number of rain gauges required to be installed in a given catchment.

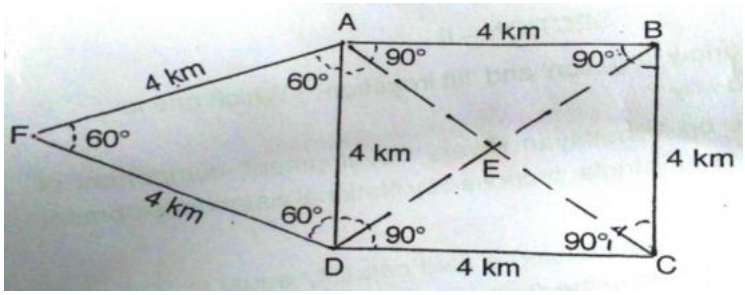
9 In a certain river basin, there are four rain gauge stations, with their normal annual precipitations amounting to 800,520, 440 and 400 mm, respectively. Determine the optimum number of rain gauges in the catchment, if is desired to limit the error in the mean value of rainfall in the catchment to 12%
[**Ans.** 8 Nos.]

10 What is meant by recurrence interval of a storm?
The values of annual precipitations at a rain gauge station expressed in cm per year in chronological sequence from 1967 to 1976 are indicated below:

70.2	31.7	68.8	50.9	60.3
58.7	43.9	50.3	48.7	67.5

Using Hazen's or any other suitable method, estimate the value of Precipitation, which has a recurrence interval of 5 year.

Q. No.	Statement
11	Figure below shows a typical layout of catchment area ABCDF. Six rain gauge stations are established A, B, C, D, E, and F as shown in fig. precipitation observed at six stations in July 2010 as follows. Find the average precipitation over the catchment during July 2010 by Thiessen's polygon method



12 Calculate average precipitation for a catchment area by Isohyetal method

Isohyet (cm)	Right of 50	50-60	60-70	70-80	80-90	90-100	Left of 100
Area under Isohyet (km^2)	8.20	49.70	31.00	36.60	35.30	32.70	9.20

13 Write down the most common empirical formula used to calculate evaporation. What are the factors affecting evaporation? Describe any one practical method of determining evaporation

14 Explain the difference between evaporation, interception and transpiration. What is transpiration ratio?

15 Briefly discuss the factors affecting the evaporation. What are the methods used to control evaporation from reservoirs?

16 Precipitation station 'X' was inoperative for part of a month during which a storm occurred. The respective storm totals at three surrounding stations A, B, C were 107, 89 and 122 mm. The normal annual precipitations at storms X, A, B and C are 978, 1120, 935 and 1200 mm respectively. Estimate the storm precipitation for station 'X'.

17 What are the different types of rain-gauges used for measurement of precipitation? Explain any one of them with a neat sketch.

18 Thiessen polygons constructed for a network of ten rain gauges in a river basin yielded Thiessen weights of 0.1, 0.16, 0.12, 0.11, 0.09, 0.08, 0.07, 0.11, 0.06 and 0.1. If the rainfalls recorded at these gauges during a cyclonic storm are 132, 114, 162, 138, 207, 156, 135, 158, 168 and 150 mm respectively. Determine the average depth of rainfall by Thiessen mean method and Arithmetic mean method. Also determine the volume of surface runoff at the basin outlet if 35% of the rainfall is lost as infiltration. Take area of the basin as 580 km^2.

19 Define infiltration; list the factors that affect the infiltration. Also explain the working of Ring infiltrometer with sketch

20 In a catchments area covering 100 km2, the average annual precipitation observed at 5 rain gauge stations is as follows.

Station	1	2	3	4	5
Precipitation (mm)	750	1000	900	650	500

Find the number of additional rain gauge stations and also the rain gauge. Density, if the permissible error is 10%.

21 Briefly discuss the factors affecting the evaporation. What are the methods used to control evaporation from reservoirs?

22 What is meant by infiltration? Enlist different factors affecting on infiltration and explain any two of them.

23 The analysis of precipitation yielded the following information regarding isohyets. Calculate the average depth of rainfall over the catchment.

Isohyetal interval (mm)	70-80	80-90	90-100	100-110	120-130
Area (km^2)	10	85	113	136	67

24 Write a short note on Depth – area – duration curve and give its applications.

25 A precipitation station 'X' was inoperative for some time during which a storm occurred. The storm rainfall totals at the stations 'A', 'B', 'C' surrounding station 'X' were respectively 6.60, 4.80 and 3.70 cm. The normal annual precipitation amounts at stations X, A, B and C are 65.6, 72.6, 51.8 and 38.2 cm. Estimate the missing storm precipitation at station X. [Ans:6.11cm]

26 What do you mean by infiltration? Enlist different factors affecting infiltration process and explainany two of them.

27 The isohyets drawn for a storm which occurred over a drainage basin of area 950 km^2 yielded the following information.

Isohyet interval (mm)	85 – 75	75 – 65	65 – 55	55 – 45	45 – 35
Area between isohyets (km^2)	125	236	264	175	X

If the average rainfall over the basin is 60.11 mm, find missing value (x) of area

28 Define precipitation. What are the different forms of precipitation? Explain in brief.

29 Explain with neat sketch hydrology cycle.

30 In a catchments area covering 200 km2, the average annual precipitation observedat 6 rain gauge stations are as follows

Station	**A**	**B**	**C**	**D**	**E**	**F**
Precipitation (mm)	82.5	102.9	180.3	110.3	98.8	136.7

Find the number of additional rain gauge stations and also the rain gauge density,if the permissible error is 10%

31 The storm over a catchment 50 km^2 was having the following intensity
40 mm/hr for 1 hr,
70 mm/hr for 2 hr,

30 mm/hr for 1 hr.
The infiltration rate of the catchment area is as follows
20% area φ = 10 mm/hr
60% area φ = 15 mm/hr
Remaining area is impervious. Find the runoff due to storm.

32 Define infiltration. List the factors that affect the infiltration. Also explain theworking of ring infiltrometer with sketch

33 The storm over a catchment 50 km2 was having the following intensity
35 mm/hr. for 1 hr.,
75 mm/hr. for 2 hr.,
32 mm/hr. for 1 hr.,
The infiltration rate of the catchment area is as follows.
25% area Ø = 10 mm/hr.
50% area Ø = 12 mm/hr.
Remaining area is impervious. Find the runoff.

34 The isohyets due to storm in a catchment were drawn and the area of the catchment bounded by isohyets was tabulated as below. Estimate the mean precipitation due to storm.

Isohyets (cm)	**Area km^2**
Station – 12	40
12-10	160
10-8	80
8-6	180
6-4	20

35 Compute the mean value of areal rainfall of the following data by using Thiessen polygon method.

Station	A	B	C	D	E	F	G	H	I
Rainfall (cm)	10	25	35	22.5	16.2	13.5	25	30	45
Polygon area (km2)	175	300	100	250	150	320	400	280	450

36 Define precipitation and explain different types of precipitation with neat sketches.

Unit.2:Runoff and Hydrograph

Q. No **Statement**

1 What is meant by `Runoff' and how is it produced? Discuss briefly the various Factors on which it depends. Or
What is mean by runoff? What are the factors that affect the runoff from a catchment area? Or
Define runoff? Explain the factors affecting runoff.

2 What is an intensity duration curve, and how will you proceed to derive such a curve for a given frequency at a gauge station from the available data of worst storms of different durations kept for a sufficient number of years.

3 Write down the general expression for intensity-duration relationship of rainfall. Explain the necessity for frequency analysis.

4 Explain briefly the rainfall-runoff process, indicating all the possible losses involved.

5 Explain clearly the following terms.
(i) Rainfall interception (ii) Infiltration capacity
(iii) Infiltration rate (iv) Rainfall excess
(v) Residual rain

6 How will you proceed to separate the base flow from a hydrograph of a river discharge?

7 Define and explain the following :
(i) Time of concentration
(ii) Period of surface runoff
(iii) Initial basin recharge.

8 Explain with sketches if necessary, the following methods for calculating net storm rain :
(a) Infiltration capacity method;
(b) ϕ_{index} method; and
(c) W_{index}method.
[**Hint.** Net storm rain means runoff]

9 A three hour storm occurs where a 62.0 sq.m. area. From the following data, estimate the net storm rain for the whole area and its hourly distribution :

Sub-area (sq.km)	$_{index}$ cm/hr	Hourly rain		
		1st	2nd	3rd
14.0	2.0	1.5	5.0	0.8
20.0	3.5	1.5	5.0	0.8
28.0	1.0	1.6	5.5	

Q. No **Statement**

10 What is a 'Unit hydrograph'? How Would you obtain a Unit hydrograph from an isolated intense short duration storm occurring uniformly over the basin? State its uses.

11 In a certain basin, ordinates of a unit hydrograph (1 cm – 6hr) are given below:

Time (in h)	0	6	12	18	24	30	36	42	48
Ordinates (cumec)	0	4	12	25	18	12	7	4	0

12 Define a 'Unit hydrograph', and explain how is it used to estimate the flood hydrograph of a storm of a given magnitude and of the same duration.

13 What is a S-curve hydrograph? How is it constructed, and what is it used for?

14 The table below gives 6-hr flood hydrograph of a storm over a catchment area of 250 km^2. the constant base flow is 10 m^3/s. compute the ordinates of 6-hr unit hydrograph and find the depth of direct runoff

Time (hr.)	**Ordinates of 6 hour Flood hydrograph (m^3 /sec)**
0	10
6	110
12	260
18	210
24	160
30	110
36	80
42	60
48	45
54	35
60	25
66	15
72	10

15 What is meant by runoff? Explain methods of separation of Base flow.

16 A catchment area of 150km2 has following type of distribution

Area	**Catchment type**	**% of area**	**Runoff coefficient K**
A-1	Urban	20	0.25
A-2	Forest	35	0.45
A-3	Commercial and Industrial	30	0.90
A-4	Concrete pavement	15	0.85

Find the annual runoff from the catchment, when the average annual precipitation is 90cm.

17 A storm with 15.0 cm precipitation produced direct runoff of 8.7 cm. The time distribution of the storm was as following.

Time hr.	1	2	3	4	5	6	7	8
Rainfall cm	0.6	1.35	2.25	3.45	2.7	2.4	1.5	0.75

Estimate the φ index of the storm**[Ans:**φ index **0.825cm/h and W index 0.785cm/h]**

18 The ordinates of 3 hour unit hydrograph are given below :

Time (Hr)	0	3	6	9	12	15	18	21	24	27	30
Ordinates (m3 /sec)	0	10	25	20	16	12	9	7	5	3	0

Form the ordinates of a 6 hour unit hydrograph for the same basin, analytically. What is the peak value of discharge in this unit hydrograph?
[Ans: Q 22.5 m3/s]

19 Write short notes on S-curve hydrograph.

20 Explain the concept of 'Unit Hydrograph'. State the assumptions and limitations of Unit Hydrograph theory.

21 Given the ordinates of a 4 – hour unit hydrograph as below, derive the ordinates of a 12 – hour unit hydrograph for the same catchment.

Time (hr)	0	4	8	12	16	20
Ordinates of 4-hour unit hydrograph (m3 /sec)	0	20	75	125	150	130
Time (hr)	24	28	32	36	40	44
Ordinates of 4-hour unit hydrograph (m3 /sec	80	55	25	15	5	0

22 The storm over a catchment 50 km2 was having the following intensity – 40 mm/hr for 1 hr, 70 mm/hr for 2 hr, 30 mm/hr for 1 hr. The infiltration rate of the catchment area is as follows. 20% area φ= 10 mm/hr 60% area φ = 15 mm/hr Remaining area is impervious. Find the runoff due to storm.

23 What is a unit hydrograph? List the assumptions in the unit hydrograph theory

24 Define 'S' curve hydrograph. Explain concept of 'S' – curve hydrograph with a neat sketch

25 You are given the ordinates of a 4 – hours unit hydrograph as below. Derive the ordinates of a 12 – hour unit hydrograph for the same catchment. Or
The ordinates of 4 hr. UH are given below. Derive the ordinates of 12 hr. UH.

Time (hr.)	**Ordinates of 4 hour Unit Hydrograph (m^3 /sec)**
0	0
4	20
8	80
12	130
16	150
20	130
24	90
28	52
32	27
36	15
40	5
44	0

26 What do you mean by runoff? How it is generated? Explain the different factors affecting runoff.

27 Ordinates of 2-hour unit hydrograph are given as below. Using this data, derive the ordinates of 6-hour unit hydrograph.

Time (hr.)	**Ordinates of 4 hour Unit Hydrograph (Cumec)**
0	0
2	25
4	100
6	160
8	200
10	170
12	110
14	70
16	30
18	20
20	8
22	0

28 Define S – curve hydrograph and explain the concept of S – curve hydrograph with a neat sketch.

29 An engineer is required to design a drainage system for an airport with an area of 2.5 km^2 for a rainfall value of 50-year return period. The 50-year rainfall intensity in that region is given by;

$$I = \frac{35}{(t+10)^{0.38}}$$

Where I is the intensity in cm/hr and t is the duration of rainfall in minutes. The 'time of concentration' for the area under consideration is estimated as 50 minutes. Calculate the design discharge for the drainage system. Take runoff coefficient equal to 1.

30 What is a Unit Hydrograph (UH) theory? State the assumptions and limitationof UH theory

31 a certain river basin, ordinates of a unit hydrograph (1 cm-6 hr) are given below

Time (Hr.)	0	6	12	18	24	30	36	42	48
Ordinates of 4-hr. Flood hydrograph (m^3 / sec)	0	4	12	25	18	12	07	04	0

Determine the peak flood and the total volume of flood flow in the basin corresponding to storm of rainfall depth 3 cm in first 6 hours and 3.5 cm in next 6 hours. Base flow at the time of storm was 5 cumecs. Assume initial loss of 5 mm and infiltration index 2.5 mm/hr.

32 Define runoff. Explain the factors affecting the runoff

33 What is a unit hydrograph? List the assumptions in the unit hydrograph theory

Unit .3:Stream Gauging and Flood

Q. No **Statement**

1 What is meant by `Stream gauging'? Enumerate the different methods Which are used for Stream gauging? Discuss anyone of these methods in details.

2 Describe briefly the dilution technique of streamflow measurement.

3 The following data is observed on a stream, in a standard current meter test:

Distance from right bank (m)	0	2	4	6	9	12	15	18	20	22	23	24
Depth (m)	0	0.5	1.10	1.95	2.25	1.85	1.75	1.65	1.50	1.25	0.75	0
No. of revolutions at 0.6 depth	0	80	83	131	139	121	114	109	92	85	70	0
Time (s)	0	180	120	120	120	120	120	120	120	120	120	0

The rating equation of the current meter is$V = 0.32N + 0.032$ m/s, where, N is revolutions/sec. Calculate the discharge of the stream, using mid-section method. [**Ans.** 11.73 cumecs]

4 What is a stage discharge curve? How is it affected by a changing stage of the river compared to a constant stage?

5 What is meant by a `permanent control' and a `shifting control'? How will you detect the possibility of a shifting control? What remedies do you suggest to obtain correct gauge measurements when the control is shifting
(i) Slowly and only during floods, (ii) quite rapidly and constantly?

6 Discuss briefly the different methods by which peak discharge of a stream during a storm can be estimated, when it may not be possible to take current-meter measurements.

7 Determine the peak flood and the total volume of flood flow in the basin corresponding to storm described below :

Period (h)	0-6	6-12
Runoff (mm)	10	20

Base flow at the time of storm was 5 cumecs.

8 What is meant by 'Design Flood', and what is it importance?

9 Enumerate the various methods which can be used for estimating design flood discharge from a certain catchment, and discuss one of these methods in details.

10 Describe briefly the various methods for obtaining the maximum flood discharge of a river. Find the values of C and n in the empirical formula $Q = CA^n$ for flood discharge Q in m^3/sec from a catchment of area A km^2 from the following data :

A(km^2)	4	10	50	100	200
Q(m^3/sec)	100	158	354	500	706

11 Find out the frequency of a flood of magnitude 10,000 cumecs, given the following record of maximum yearly peak floods for 10 years. Also discuss the preciseness of the result, so obtained.

Year	**Flood peak in cumecs**
1951	3200
1952	4250
1953	6250
1954	3100
1955	2800
1956	3500
1957	8500
1958	8900
1959	4200
1960	5200

12 What is flood and discuss various factors affecting flood?

13 Explain the following terms related to flood frequency studies :
i) Flood frequency ii) Recurrence interval iii) Return period iv) Probability of occurrence.

14 Write short notes onStream gauging.

15 Enlist different methods of stream gauging and explain briefly the 'area velocity method' of stream gauging.

16 Compute the stream flow for the measurement data given below :

Distance (m)	0	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6
Depth (m)	0	0.3	1.29	2.16	2.55	2.22	1.68	1.41	1.05	0.63	0.42	0
Velocity at 0.2 d (m/s)	0	0.42	0.57	0.78	0.87	0.81	0.75	0.69	0.63	0.54	0.45	0
Velocity at 0.8 d (m/s)	0	0.21	0.36	0.54	0.6	0.3	0.51	0.44	0.39	0.33	0.3	0

17 Explain the dilution technique of stream flow gauging

18 Estimate the stream flow for the measurement data as given below

Distance (m)	0	2	4	6	8	10	12	14	16	18	20
Depth (m)	0	0.5	1.2	1.8	2.4	2.6	2.0	1.8	1.6	1.0	0
Velocity at 0.2 d (m/s)	0	0.3	0.4	0.6	0.9	1.2	0.9	0.7	0.5	0.3	0
Velocity at 0.8 d (m/s)	0	0.2	0.3	0.35	0.4	0.45	0.4	0.5	0.4	0.2	0

[Ans:17.2 m3/s]

19 What is meant by stream gauging? What are the factors; those are considered for selection of site for stream gauging?

20 The data pertaining to a stream gauging operation at a gauging site are as below. The rating equation of the current meter is V = 0.51 Ns + 0.03 m/sec. Where Ns = revolution per second. Calculate the discharge in stream

Distance from left bank (m)	0	1	3	5	7	9	11	12
Depth (m)	0	1.1	2	2.5	2	1.7	1	0
Number of revolutions of current meter at 0.6 depth	0	39	58	112	90	45	30	0
Time for completing revolutions (sec)	0	100	100	150	150	100	100	0

[Ans: 6.45m3/s]

21 What do you mean by stream gauging? What are the factors those are considered for stream gauging site selection?

22 Explain with a neat sketch, different components of a single peak storm hydrograph. Elaborate the terms associated with it.

23 What do you mean by stream gauging? Enlist the factors considered for site selection for stream gauging.

24 The current meter observations taken during the gauging of a storm are given below. The current meter rating may be taken as v = 0.05 + 0.3 N, where v is in m/s and N is in rev/s. Compute discharge in the stream

Distance from bank(m)	Depth of flow (m)	Current meter depth (m)	Number of revolutions per minute	Time (sec)
0.8	0.5	0.3	12	48
1.6	1.0	0.8	23	52
-	-	0.2	36	51
2.4	1.6	1.28	27	54
-	-	0.32	41	60
3.0	2.0	1.6	33	58
-	-	0.40	45	62
3.6	2.0	1.6	32	58
-	-	0.44	44	60
4.2	1.8	1.44	28	53
-	-	0.36	42	58
5.0	1.2	0.96	24	50
-	-	0.24	35	50
5.8	0.6	0.36	14	45
6.6	0.0	-	-	-

25 Enlist different methods of stream gauging. Explain any one method in detail

26 Estimate the streamflow for the measurement data as given

Distance (m)	**Depth (m)**	**Velocity at 0.2d (m / s)**	**Velocity at 0.8d (m / s)**
0	0	0	0
2	0.5	0.3	0.2
4	1.2	0.4	0.3
6	1.8	0.6	0.35
8	2.4	0.9	0.40
10	2.6	1.2	0.45
12	2.0	0.9	0.40
14	1.8	0.7	050
16	1.6	0.5	0.40
18	1.0	0.3	0.20
20	0.0	0.0	0.0

27 The following are the data obtained in the stream gauging operation. A currentmeter with equation of V = (0.32 N + 0.032) m/s, velocity measured at depth of 0.6.Where N is no. of revaluations per seconds. Calculate stream flow.

Distance (m)	Depth (m)	Number of revolutions	Observation time (s)
0	0	0	0
2	0.5	80	180
4	1.1	83	120
6	1.95	131	120
9	2.25	139	120
12	1.85	121	120
15	1.75	114	120
18	1.65	109	120
20	1.50	92	120
22	1.25	85	120
23	0.75	70	150
24	0	0	0

28 Define term design flood. List the methods of estimation of flood. Explain anyone in detail

29 Estimate the stream flow for the measurement data as given below

Distance (m)	Depth (m)	Velocity at 0.2d (m / s)	Velocity at 0.8d (m / s)
0	0	0	0
1	0.4	0.52	0.31
2	1.39	0.67	0.46
3	2.26	0.88	0.64
4	2.65	0.97	0.70
5	2.32	0.91	0.31
6	1.78	0.85	0.61
7	1.51	0.79	0.55
8	1.15	0.73	0.49
9	0.52	0.55	0.40
10	0	0	0

30 The following data were collected during stream gauging operation in a river. Compute the discharge.

Distance from left water edge (m)	0	1.5	3.0	4.5	6.0	7.5	9.0
Depth (m)	0	1.3	2.5	1.7	1.0	0.4	0.0
Velocity at 0.2 d (m/s)	0	0.6	0.9	0.7	0.6	0.4	0.0
Velocity at 0.8 d (m/s)	0	0.4	0.6	0.5	0.4	0.3	0.0

31 Enlist different methods of stream gauging and explain the area-velocity method of stream gauging.

Unit.4:Ground Water Hydrology

Q. No	Statement
1	Explain briefly the following terms as used in groundwater flow studies (a) Specific yield (b) Storage coefficient (c) Specific capacity (d) Barometric efficiency
2	Explain the following (a) Perched water table (b) Intrinsic permeability (c) Bulk pore velocity (d) Well loss (e) Recharge
3	Discuss the geological formations in India which have potential as aquifers.
4	Explain the behavior of water level in wells in confined aquifers due to changes in the atmospheric pressure.
5	Develop the equation relating the steady state discharge from a well in an unconfined aquifer and depths of water table at two known positions from the well. State clearly all the assumptions involved in your derivation.
6	What are Dupit's assumptions? Staiting from an elementary prism of fluid bounded by a water table, show that for the steady one-dimensional unconfined groundwater flow with a recharge rate *R,* the basic differential equation is $$\frac{d_h^2}{d_x^2} = \frac{2R}{K}$$ Where *K* = permeability of the porous medium.
7	Derive the basic differential equation of unsteady groundwater flow in a confined aquifer. State clearly the assumptions involved.
8	Describe the recovery test to estimate the transmissivity of a confined aquifer.
9	Explain briefly i. Safe yield of aquifer ii. Recharge estimation
10	The drawdown time data recorded at an observation well situated at a distance of 50 m from the pumping well is given below: If the well discharge is 1800 1pm, calculate the transmissibility and storage coefficients of the aquifer.
11	Estimate the discharge of a well pumping water from a confined aquifer of thickness m with the following data:

Time (min)	1.5	3	4.5	6	10	20	40	100
Drawdown (m)	0.15	0.6	1	1.4	2.4	3.7	5.1	69

Distance of observation well from the pumping well = 100 m Drawdown at the observation well after 4 hours of pumping = 1.5 m Drawdown at the observation well after 16 hours of pumping - 2.0 m Storage coefficient, S = 0.0003

12 A fully penetrating well in a confined aquifer is being pumped at a constant rate 2000 Lpm. The aquifer is known to have a storage coefficient of 0.005 and transmissivity o 480 m^2/day. Find the drawdown at a distance of 3.0 m from the production well after
(i) One hour and (ii) 8 hours after pumping.

13 A fully penetrating well in a confined aquifer is pumped at the rate of 60 m /h from an aquifer of storage coefficient and transmissibility 4x10^-4 and 15 m /h respectively. Estimate the drawdown at a distance of 100 m after 8 hours of pumping

14 A fully penetrating confined aquifer is pumped at a constant rate of 100 m /h. At an observation well located at 100 m from the pumping well the drawdown where observed to be 0.65 m and 0.80 m after one and two hours of pumping respectively Estimate theformation constants of the aquifers.

15 What do you understand by recuperation test? Derive the expression used in this test?

16 Diameter of well is 4 m. Normal water level is 6 m below GL. Pumpingdepresses water level to 16 m below GL. 2 hours after stopping, pumpingwater recuperated by 4 m. What is the specific capacity of the well? Findthe yield of well for drawdown of 4 m.

17 Write a short note on Dupits theory of ground water flow in unconfined aquifer

18 Discuss various types of aquifers with reference to ground water availability. Or
Enlist, classify and discuss in brief, geological formations where ground water occurs.

19 A well with radius of 0.25 m, completely penetrates into confined aquifer of thickness 20 m and hydraulic conductivity 8.2 × 10–4 m/s. What is the maximum yield expected from this well, if the drawdown in the well is not to exceed 3 m. The radius of influence may be taken as 260 m.

20 Design an open well in coarse sand aquifer for a yield of 0.004 cumec.When worked under depression head of 3.0 meters. Assume specific yield of an open well in coarse sand as 1.0 m3/hr.m^2per unit drawdown.

21 Design a tube well for following data :
i) Yield required = 0.2 cumec
ii) Thickness of confined aquifer = 40 m
iii) Radius of circle of influence = 300 m
iv) Permeability coefficient = 80 m/ day Drawdown = 6 m

22 Explain :
i) Darcy's law for ground water movement. ii) Confined aquifer. iii) Unconfined aquifer.

23 During a recuperation test conducted on open well in a region, the level in the well was depressed by 4 m and its was observed to rise by 2 m in 60 minutes. Find :
i. Yield from well of 5 m diameter under depression head of 3.5 m.
ii. The diameter of well to give a yield of 12 litre/sec under a depression head of 3 m.

24 What do you mean by open well ? Enlist and explain factors considered for design of open well.

25 A well with radius of 0.5 m, completely penetrates an unconfined aquifer of thickness 50 m and hydraulic conductivity K = 30 m/day. The well is pumped so that the water level in the well remains at 40 m above the bottom. Assuming that pumping has essentially no effect on water table at radius of 500 m, what is steady state discharge?

26 Explain with neat sketches Confined aquifer and Unconfined aquifer.

27 A 30 cm diameter well completely penetrates a confined aquifer of permeability 45 m/day. The length of strainer is 20 m. Under steady state of pumping, the drawdown at the well was found to be 3.0 m and the radius of influence was 300m. Calculate the discharge of the well.

28 Enlist, classify and discuss in brief, geological formations where ground wateroccurs.

29 During a recuperation test, the water in an open well was depressed by pumping by 2.5 m and it is recuperated 1.8 m in 80 minutes. Find
i. Yield from a well of 4 m diameter under a depression head of 3m.
ii. The diameter of the well to yield 8 lit./sec. under a depression head of 2 m

30 Explain the terms :
i) Confined Aquifer
ii) Unconfined Aquifer and
iii) Aquiclude. OR
Explain with neat sketches:
Confined and unconfined aquifers

31 Design an open well in fine sand to give a discharge of 0.004 cumec when workedunder depression head of 3.0 meters. Specific yield of an open well in sand maybe taken as 0.5 per hour, per square meter of area under unit depression head.

32 Discuss various types of aquifers with reference to ground water availability.

33 Diameter of well is 8 m. Normal water level is 6 m below G.L. Pumpingdepresses water level to 16 m below GL. 4 hours after stopping pumpingwater recuperated by 6 m. What is the specific capacity of the well? Findthe yield of well for drawdown of 6 m.

34 Explain the terms
i) Aquifer

ii) Specific yield and
iii) Specific capacity of well

35 Distinguish between
(a)Aquifer and aquitard
(b) Unconfined aquifer and a leaky aquifer
(c)Water table and piezometric surface

36 A tube well of 30 cm diameter penetrates fully in as artesian aquifer. The strainer length is 15 m. calculate the yield from the well under a drawdown of 3 m. the aquifer consists of sand of effective size of 0.2 mm having coefficient of permeability equal to 50m/day. Assume radius of drawdown equal to 150m.**[Ans: Q=20.40m3/day or 23.6 lps]**

	Unit .5: Water Resources development in India and Maharashtra
Q. No	**Statement**
1	What are the salient features of National water policy?
2	What are the Problems in water resources developments in our country and Maharashtra state?
3	Write short note on National perspective plan of India?
4	Write short note on Himalayan rivers component and peninsular rivers component.
5	Write a short note on inter basin transfer of water
	Write detailed note on Himalayan Rivers Development component of interbasin transfer of water in India, proposed by National Water policy Development academy
	Write a detailed note on river linking projects of India, proposed by NWDA.
6	Enlist the proposed inter basin water transfer links proposed for Himalayan Rivers, Development component of National perspective plan. State the advantages of Himalayan component
7	Write a detailed note on river linking projects of India, proposed by NWDA.
8	Write a note on scope or irrigation. What is meant by a ‘multipurpose river valley project’?
9	Enlist the proposed inter basin water transfer links proposed for the peninsular rivers development component of National Perspective Plan. State the advantages of the peninsular component.
10	What do you mean by ‘Inter-basin Transfer of water’ ? Elaborate its necessity in India with respect availability of water resources in various river basins of India
11	Write a detailed note on ‘National Perspective Plan’ of National Water Development Academy forInter-basin transfer of water in India.
12	Discuss the peninsular river component of national prospective plan of India for interbasin transfer of water
13	Discuss the Himalayan River Component of national prospective plan of India forinterbasin transfer of water

Unit No.6: irrigation

Q. No	Statement
1	Define irrigation and explain its necessity in a tropical country like India. What are the advantages and ill-effects of assured irrigation?
2	What is meant by surface and sub-surface irrigation: and what are their types ? Discuss briefly the various techniques used for distributing water in the farms.
3	What is meant by 'Furrow Irrigation' and 'Sprinkler Irrigation'? Which one is preferred in India and why?
4	What is meant by 'Border flooding', and how does is differ from 'Check flooding' and 'Free flooding'?
5	How is the Flow irrigation different from the Lift irrigation?
6	Write short notes on: (i) Lift irrigation. (ii) Mixed cropping. (iii) Ill-effects of irrigation. (iv) Border strip and Sprinkler methods of irrigating fields. (v) Sodium-Absorption-Ratio (SAR). (vi) Salt concentration of irrigation waters and their utility in Irrigation. (vii) Sodium hazards of irrigation waters. (viii) Boron concentration in irrigation waters. (ix) Drip irrigation method.
7	With neat sketch explain general layout and component parts of lift irrigation system. When it is required.
8	Explain the conditions favorable for provision of bandhara and percolation tank irrigation?
9	Explain with neat sketch general layout of both percolation tank and Bandhara?
10	What is mean by furrow irrigation and lift irrigation? Which one is preferred in India and why?
11	Define irrigation. What are the benefits that can be assured from irrigation projects?
12	How is the flow irrigation different from lift irrigation? State the components of lift irrigation system in brief.
13	Discuss the concept of 'Bandhara irrigation system' with its advantages and disadvantages. Or Discuss the concept of 'Bandhara irrigation system' with its necessity andlayout
14	Discuss the conditions favoring adoption of sprinkler irrigation method. Also discuss the limitations of this method.

15 Discuss different techniques of rain water harvesting and ground water harvesting.

16 Write a note on any two :
i) Percolation Tank ii) Warabandi System iii) Rainwater Management.

17 Describe with a neat sketch, general layout of a lift irrigation scheme. Briefly explain the 'Jack Well'.

18 Define irrigation and explain its necessity in a tropical country like India. What are the advantages and ill effects of assured irrigation?

19 What do you understand by contour forming? Compare it with the wild flooding method of irrigation

20 Write a short note on following (any three).
I) Ill effects of irrigation II) Mixed cropping
III) Sub surface irrigation IV) Lift irrigation.

21 Discuss general layout of a lift irrigation scheme. Also discuss its different components.

22 Write the advantages and disadvantages of Drip irrigation system.

23 Enlist the main features of a lift irrigation scheme located at the bank of river. Discuss the economic feasibility of lift irrigation.

24 Discuss the suitability and construction features of Kolhapur type weir for irrigation.

25 Discuss with a neat sketch, layout and advantages of a typical drip irrigation system. List the crops suitable for drip irrigation.

26 What do you mean by lift irrigation? Draw a typical layout of a Lift Irrigation Scheme and discuss thedifferent components of a scheme

27 Discuss 'Bandhara irrigation system' with its advantages and disadvantages

28 State the main components of Drip Irrigation system and describe the functions of each

29 Write short note on Kolhapur type Weir.

30 Discuss the various soil types observed in India. Discuss the suitability of eachtype for crops and irrigation.

31 Describe with a neat sketch, general layout of a lift irrigation scheme. Briefly explainthe 'Jack Well

32 Describe with neat sketch, general layout of a lift irrigation scheme. Brieflyexplain design procedure of lift irrigation scheme.

33 State the main components of sprinkler irrigation system with sketches and discuss working of the system.

34 Discuss the economic feasibility of lift irrigation. Compare lift irrigation and canal irrigation from various aspects.

Unit No.7: Soils and Crop water requirement

Q. No **Statement**

1 Give the general classification of soils and their suitability for different crops.

2 Explain the term Wilting coefficient.

3 Explain with neat sketch different types of Soil moisture contents?

4 What is meant by 'Duty' and 'Delta' of canal water? Derive a relationship between duty and delta for a given base period.Find the delta for sugarcane when its duty is 730 hectares/cumec on the field and base period of the crop being 110 days

5 Define and explain the following terms as used in relation to water requirements of Crops:
(i) Base period. (ii) Intensity of irrigation. (iii) Cash crops.

6 What do you understand by 'Duty' of canal water and what is its importance? Explain how does duty differs from that at head of a water-course and that at the head a canal bringing water to the watercourse

7 What is meant by 'duty'?What are the factors affecting duty? How it can be improved?
The base period of paddy 120 days. If the duty for this crop is 900 hectares per cumec. Find the value of delta.

8 Define and explain the following terms :
(i) Cash crops (ii) Field capacity
(iii) Available moisture (iv) Soil moisture deficiency
(v) Crop ratio (vi) Overlap allowance
(vii) Paleo irrigation (viii) Kor water depth

9 Define the following terms
i) Gross Command area
ii) Crop period
iii) Base period
iv) Capacity factor
v) Kor-watering and Kor-depth.

10 Table below gives necessary data about the crop, their duty and the area undereach crop, commanded by a canal taking off from storage reservoir. Find thereservoir capacities if the canal losses are 20% and reservoir losses are 12%.

Crop	Base period (days)	Duty at field (ha / cumec)	Area under the crop (Ha)
Wheat	120	1800	4800
Sugarcane	360	800	5600
Cotton	200	1400	2400
Rice	120	900	3200
Vegetables	120	700	1400

[Ans: 47244.32 Hector-m]

11 Discuss the terms field capacity, wilting point and optimum water content.

12 The irrigation canal has GCA of 80000 hectares out of which 85% is culturable, the intensity of irrigation for Kharif season is 30% and for Rabbi season 60%. Find the discharge required at the head of the canal. If the duty at its head is 800 hectare/cumec for Kharif and 1700 hectares/cumec for Rabbi season

13 Discuss the various types of soils in India with reference to their formation and suitability for irrigation

Discuss the various types of soils in India with reference to their suitability for irrigation

14 Discuss the factors affecting the duty of water in a canal system. What methods will you suggest to improve the duty?

15 The following data pertains to the healthy growth of a crop
i) Field capacity of soil = 30%
ii) Permanent wilting point = 11% iii) Density of soil = 1300 kg/m3
iv) Effective depth of root zone = 700 mm
v) Daily consumptive use of water = 12 mm For healthy growth, moisture content must not fall below 25% of the water holding capacity and the permanent wilting point. Determine the watering interval in days.**[Ans: dw=0.1296 m, Frequency of irrigation 10 days]**

16 Describe with the help of a diagram, various forms of soil moisture. What do you understand by the term 'available moisture'?

17 Discuss the various soil types observed in India. Discuss suitability of each soil type for crops and irrigation

18 What is meant by 'Duty' and 'Delta' of canal water ? Derive the relationship between Duty and Delta.

19 The GCA for a watercourse is 1200 hectares. Intensities of sugarcane and wheat crops are 20% and 40% respectively. The duties for the crops at the head of the watercourse are 730 ha/cumec and 1800 ha/cumec, respectively. Find a) The discharge required at the head of the watercourse. b) Determine the design discharge at the outlet, assuming a time factor equal to 0.8.

20 State the importance of soil in agriculture and write a note on Indian soils.

21 A certain crop is grown in area of 3000 hectares, which is fed by canal system. The data pertaining to the irrigation. Irrigation are as follows : Field capacity of soil = 26%; optimum moisture = 12; permanent wilting point = 10%, effective depth of root zone = 80 cm, relative density of soil = 1.4 If the frequency of irrigation is 10 days and the overall efficiency is 23%, find i) Daily consumptive use ii) The water discharge in m3/second required for the canal feeding area.

22 Explain the terms 'duty' and 'delta'. Derive the relationship between the two terms

23 Discuss the composition of black soils observed in India. Comment about their fertility, drainage properties and suitability for irrigation using surface water sources.

24 Wheat is to be grown in a field having field capacity equal to 27% and permanent wilting point is 13%. Find the equivalent depth of water stored in 80 cm soil depth. Assume dry unit weight of soil is 14.53 kN/m^3 and unit weight of water is 9.81 kN/m3. If irrigation water is to be supplied when the average soil moisture falls to 18%, find the water depth that needs to be applied to the field. Assume that the field water application efficiency is equal to 80%. What amount of water is needed at the canal outlet if the water lost in water course and the field channel is 15% of the outlet discharge?

25 Table below gives a necessary data about the crops, their duty and area under each crop, commanded by a canal, taking off from a storage reservoir. Taking a time factor for a canal

to be 13/20, calculate the discharge required at the head of the canal. Also determine design discharge, if capacity factor of a canal is 0.8.

Crop Base period Area (hectares)	**Crop Base period Area (hectares)**	**Crop Base period Area (hectares)**	**Duty at the head of canal (ha/cumec)**
Sugarcane (yearly)	320	850	580
Overlap of sugarcane in hot weather)	90	120	580
Wheat (Rabbi)	120	600	1600
Bajri (Kharif)	120	500	2000
Vegetable (Hot weather)	120	260	600

26 Classify Indian soils depending upon their origin and mineral contents. Discuss their suitability for different crops. OR
Classify Indian soils depending upon their origin and their suitability for various crops.

27 Sufficient irrigation water is to be applied to a crop. Calculate after how many days you will supplywater to the crop, based on the following data.
Field capacity of soil = 29%. Permanent wilting point = 14%, Dry unit weight of soil = 12.75 kN/m^3, Unit weight of water = 9.81 kN/m^3, Effective depth of root zone = 70 cm, Daily consumptive use ofwater for given crop = 12 mm.

28 A reservoir is proposed to be constructed to command an area of 120000 hectares. It is anticipated that ultimately sugar and paddy would both be irrigated equal to 20% each, of the command and Rabi crops equal to 50% of command making a total annual irrigation equal to 90% of commanded area. Work out storage requirement of a reservoir, assuming total water requirement and average duty as following. Assume canal losses at 25% of the head discharge. Take reservoir evaporation and deadstorage losses at 20% of gross capacity.

Crop	Total water depth required (cm)	Duty in hectare/cumec
Sugarcane	90	600
Paddy (Kharif)	120	637
Rabi crops	40	1728

29 What are the factors affecting duty of irrigation water? How can duty beimproved?

30 The base period, intensity of irrigation and duty of various crops under a canal irrigation system are given below. Find the reservoir capacity if the canal losses are 20% and reservoir losses are 12%.

Crop	Base period (days)	Duty at field (ha / cumec)	Area under the crop (Ha)
Wheat	12	1800	4800
Sugarcane	360	800	5600
Cotton	200	1400	2400

Rice	120	900	3200
Vegetables	120	700	1400

31 Define the terms :
i) Culturable command areaii) Intensity of irrigation
iii) Time factor iv)Capacity factor

32 Discuss the various types of soils in India with reference to their suitability forirrigation.

33 What is meant by 'Duty' and 'Delta' of canal water ? Develop the relationshipbetween duty and delta for given base period.

34 After how many days will you supply water to soil (clay loam), in order to ensure efficient irrigation of the given crop if :
i) Field capacity of soil – 27%
ii) Permanent wilting point – 14%
iii) Density of soil – 1.5 gm/cm3
iv) Effective depth of root zone – 75 cm
v) Daily consumptive use of water for a given crop – 11 mm.

35 Discuss the terms field capacity, wilting point and optimum water content.

36 A soil holds water at 140 mm per m depth between field capacity and permanent wilting point. The root zone depth is 30 cm and the allowable depletion of water is 35%. The daily water use of crop is 5 mm/day. The area to be irrigated is 60 Ha. Water can be diverted at 28 lit/sec. the surface irrigation application efficiency is 40%. Determine
i) Allowable depletion depth between successive irrigation.
ii) Frequency of irrigation.
iii) Net application depth of water.
iv) Volume of water required.
v) Time to irrigate 4 Ha plot

Assignment No.8: Water shed management and Application of remote sensing technique				
Diff. Level	**Q. No**	**Statement**	**Marks**	**Year**
A	1	What is mean by water shed management? why it is essential?		
A	2	Write a short note on Importance of soil and waterconservation		
A	3	What is mean by reservoir sedimentation? What are the factors those influence it?		
A	4	What are the different methods of rainwater and ground water harvesting? Explain them briefly		
A	5	What are the different methods of canal water revenue Assessment? Explain them briefly. Or Write a note on canal revenue assessment methods. OR Discuss various methods of assessment of irrigation water. Discuss in specific the shortcomings of volumetric assessment methods.	05 07 04	May2018 May2014 Dec2019
A	6	Write a short note on remote sensing and geographic information system for water resources development and management.		

B	7	How the remote sensing and GIS can be used effectively for management and development of water resources system.		
B	8	Enlist the watershed erosion control measures which are effective in preventing and delaying sediment deposition in reservoirs.	06	May2013
A	9	Write short note on Canal revenue assessment methods	04	May2013
A	10	Discuss critically watershed management is a need of time to conserve the fertile soil as well as to reduce reservoir sedimentation rates.	07 04	May2014 May2019
A	11	List the various soil conservation measured adopted for watershed erosion control	06	Dec 2014
A	12	Write a note on role of former's cooperatives in irrigation water management.	08	Dec 2014
A	13	What are the different structures constructed in watershed to retain soil and conserve water ? Discuss briefly.	07	May2015
A	14	State the measures adopted for control of sediment inflow in the reservoirs	06	Dec 2015
A	15	List and discuss the canal revenue assessment methods, with advantages and disadvantages of each.	05	May2016
B	16	What do you mean by 'Rainwater Harvesting' ? Elaborate with a neat sketch, 'Roof top rainwater harvesting' practiced in urban areas.	04	May2016
B	17	What do you mean by 'Watershed management'? Describe its necessity for soil and water conservation.	05	May2016
B	18	Discuss the need of soil and water conservation in agricultural fields. What are the different structuresconstructed in watershed for soil conservation?	04	Dec 2016
A	19	Discuss the role of 'Water Users Organization' in irrigation management	05	Dec 2016
B	20	What are the different structures constructed in watershed to retain soil and conserve water? Discuss briefly.	04 05	May2017 Dec2018
A	21	Discuss the role of co-operative water user's organizations in 'on farm waterdistribution', for canal irrigation system.	04 04(Old) 04	Dec 2017 Dec2018 Dec2018
B	22	Write a note on : i) Percolation Tank ii) Warabandi System iii) Rainwater Harvesting OR What is percolation tank? Why it is necessary? What are the important points those considered in for selecting site for percolation tank?	09 09(Old) 05	Dec 2017 Dec 2017 May2019
B	23	Write a short note on : a) Need of water shed management? b) Application of Remote Sensing and GIS. c) Reservoir Sedimentation.	09	May2018

Question Bank

Subject-Civil
(Self Learning: Planning for Sustainable) for Class-B Tech III Sem VI (w.e.f.Nov.2020) CBCS

1.	Enlist the principles of sustainable development. (10 marks)
2.	Explain the need of Innovation strategies & Environmental Management. (10 marks)
3.	Write a short note on institutional theory in sustainable development? (10 marks)
4.	What are the policy responses for environmental degradation? (10 marks)
5.	What measures can be undertaken for sustainable development in civil engineering projects. (10 marks)
6.	What do you understand by 'Squaring the circle' concept in sustainable management? (10 marks)
7.	Explain the contribution of innovation in sustainable development? Explain. (10 marks)
8.	What are the necessities of sustainable development? (10 marks)
9.	Explain two alternative approaches of sustainable development used in waste management. (10 marks)
10.	What are the various policy reforms done for prevention of environmental degradation? (10 marks)
11.	Write a short note on innovation in sustainable development. (10 marks)
12.	With help of example, enlist the procedure of energy recovery implemented under sustainable development of landfill. (10 marks)
13.	How environmental degradation can be reduced using innovative strategies. (10 marks)
14.	Explain institutional theory in sustainable development. (10 marks)
15.	What measures should be taken to improve the air quality Urban India. (10 marks)
16.	As per CPCB, the monitoring of air quality is done on hourly basis. Comment your views how this can be helpful for the society. (10 marks)
17.	Define eutrophication. Also briefly write the characteristics of a eutrophied lake. (10 marks)
18.	As the district environmental officer, explain a strategy for the protection of lakes from eutrophication. (10 marks)
19.	The district collector of your district has appointed you to check on the disposal of waste management of your district. Explain the mandatory dos and don'ts that will be issued by you to tackle the current situation. (10 marks)
20.	As an environmental engineer, you have been given a project to tackle with the wastewater from domestic and industrial sector mixing in fresh water and contaminating the drinking water source. Prepare risk assessment and mitigation measure plan to reduce the impact and creating awareness. (10 marks)

Question Bank

Class-B Tech IV Sem VII (w.e.f.Nov.2021) New CBCS

Civil (Subject: Economic Policies in India)

Q2.Answer the following questions (Any three)

1) State the need and objectives of economic policy in India
2) Explain the various instruments of economic policy in India
3) Examine the dynamics of formulation of economic policies in India
4) Identify the causes of failures of economic policies in India.

Q2.Answer the following questions (Any three)

1) What do you mean by the term 'Economic Policy'?
2) Why do we need state intervention in the economic affairs of a country? Give two reasons in support of your answer.
3) Why is 'full employment' included among the objectives of economic policy?
4) State the principal instruments of macro-economic policy.

Q2.Answer the following questions (Any three)

1) Do you think that economic policies are essentially political decisions?Give two reasons in support of your answer.
2) How is CSO useful in policy formulation process?
3) State any two disappointing outcomes of Indian Economic Policy.
4) 'Economic Policy in India is a purely political process'. Comment.

Q2.Answer the following questions (Any three)

1) Examine how different shades of public opinion influence the process of Economic policy formulation. Give illustrations in support of your answer.
2) Discuss the various disappointing outcomes of the poor implementation of economic policies.
3) Suggest some measures to improve implementation of economic policy and programmes in India.

Q2.Answer the following questions (Any three)

1) What are the characteristics of Indian Economy? Discuss.
2) Write a short note on industries and handicrafts in pre-British India.
3) What are the causes of the decline of Indian Handicrafts? Explain.
4) Discuss the commercialization of agriculture.
5) Explain the process to Industrial transition in India.

Q2.Answer the following questions (Any three)

1) What are the objectives of economic planning? Discuss
2) Explain the strategies and evaluation of planning.
3) India as a mixed economy? Explain.
4) What is meant by democratic socialism in India? Explain.

Q2.Answer the following questions (Any three)

5) Write a short note on the Eleventh five year plan.
6) What are the objectives of the Eleventh plan?
7) Discuss the macro economic dimensions of the eleventh plan.
8) Briefly explain the sectoral allocation of resources.

Q3.Answer the following questions (Any two)

1) State the need and objectives of economic policy in India
2) Explain the various instruments of economic policy in India
3) Examine the dynamics of formulation of economic policies in India
4) Identify the causes of failures of economic policies in India.

Q3.Answer the following questions (Any two)

1) What do you mean by the term 'Economic Policy'?
2) Why do we need state intervention in the economic affairs of a country? Give two reasons in support of your answer.
3) Why is 'full employment' included among the objectives of economic policy?

4) State the principal instruments of macro-economic policy.

Q3.Answer the following questions (Any two)

1) Discuss the economic reforms in India since 1991.
2) What is the impact on labour of economic reforms? Explain.
3) Write a short note on the Foreign Investment.

Q3.Answer the following questions (Any two)

1) Do you think that economic policies are essentially political decisions?Give two reasons in support of your answer.
2) How is CSO useful in policy formulation process?
3) State any two disappointing outcomes of Indian Economic Policy.
4) 'Economic Policy in India is a purely political process'. Comment.

Q3.Answer the following questions (Any two)

1) Examine how different shades of public opinion influence the process of
2) Economic policy formulation. Give illustrations in support of your answer.
3) Discuss the various disappointing outcomes of the poor implementation of economic policies.
4) Suggest some measures to improve implementation of economic policy and programmes in India.

Q3.Answer the following questions (Any two)

1) What do you mean by national income ? How it estimate.
2) Examine the Trends in National Income Growth and Structure.
3) Describe the limitations National Income Estimation in India.
4) Explain the reason for the slow rate of Growth of the Indian Economy.
5) Discuss the trends and structure of national income.

Q4.Answer the following questions (Any two)

1) Examine the basic demographic Features of India. Also examine their relevance for India economic policy for development.
2) From the perspective of economic policy for growth, examine the nature of different indicators of economic development.
3) Discuss the demographic features of Development.
4) How will you measure the birth rate and death rate? Illustrate by examples.
5) Discuss the reasons for the decline in sex ratio.

Q4.Answer the following questions (Any two)

1) What is the concept of poverty?
2) Discuss the causes of poverty.
3) Why do we need to redefine the poverty line? Explain.
4) How will you empower the poor through provision of housing?

Q4.Answer the following questions (Any two)

1) What is the concept of Unemployment? Discuss.
2) Discuss the causes of Unemployment in India.
3) Write a short note on the government policies for employment.
4) Define inflation. Can any price rise be called inflation ? What is the acceptable or desirable limit of inflation ?

Q4.Answer the following questions (Any two)

1) How is inflation measured ? Explain the methods of measuring inflation with examples.
2) What is meant by national income deflator ? How is national income deflator used to measure inflation ?
3) Why is a moderate rate of inflation considered to be desirable for the economy ? What are the limits of desirable rate of inflation for the developed and developing nations ?
4) What are the types of inflation ? How do they differ from one another ?

Q4.Answer the following questions (Any two)

1) What is meant by inflation tax ? Under what conditions is inflation tax used as a source of financing growth ?

2) Discuss the role of Public Sector.
3) Why is there a need for economic policy? Explain.
4) What do you mean by pre an post reforms

Q4.Answer the following questions (Any two)

1) Critically examine the Indian Economy Policies.
2) How does inflation affect economic growth ? How can inflation be used to make the economy grow?
3) Explain the relationship between inflation and employment. Is achieving a high rate of employment by means of inflation always desirable ?

Q5.Answer the following questions (Any two)

1) What is the importance of agriculture in the Indian economy.
2) Do you consider the agricultural sector in India as the backbone of the economy.
3) Trace the growth of production in the agricultural sector in India.
4) What are the main features of cropping pattern in India ?

Q5.Answer the following questions (Any two)

1) Discuss the new strategy implemented to improve agricultural sector.
2) What do you mean by Green Revolution? Discuss.
3) Identify the recent issues in Indian Agriculture.
4) What are the challenges we are facing in agriculture in India? Explain.

Q5.Answer the following questions (Any two)

1) Discuss the opportunities in the challenges.
2) What do you mean by rural credit? Discuss the various sources of Rural Credit?
3) Write a short note on the rural co-operative movement.
4) Discuss the working and functions of Nabard.

Q5.Answer the following questions (Any two)

1) Explain the rural and agricultural marketing. What are the basic facilities needed for agricultural marketing?
2) Discuss the role of WTO.
3) What is the WTO agreement on agriculture? Discuss.

Q.6. Answer the following questions (Any two)

1) Discuss the pre reform period in industrial sector.
2) What is meant by industrialization? Discuss the role of industrialization.
3) What is meant by pattern of ownership industries?
4) Write a short note on small scale industries in India.
5) Discuss the industrial sector in post-reform period.
6) What are the issues of public sector?
7) Discuss the problems of public sector.
8) Discuss the role of public sector.

Q.7. Answer the following questions (Any two)

1) Discuss the role of infrastructure in economic development.
2) Explain the availability of primary energy in India.
3) What are the non-conventional sources of energy? Discuss.
4) What do you mean by the term Indian Capital Market? Discuss.
5) Discuss the features of the Indian Money.
6) Explain the reform of the Indian Money Market.
7) Write a short note on the Monetary Policy of India.
8) What are the objectives of Monetary Policy?
9) What do you mean by the term Indian Capital Market? Discuss.
10) Discuss the features of the Indian Money.
11) Explain the reform of the Indian Money Market.
12) Write a short note on the Monetary Policy of India.

13) What are the objectives of Monetary Policy?

Q.8. Answer the following questions (Any two)

1) What is foreign trade? Discuss its status before Independence.
2) Discuss the balance of payments.
3) What is the role of FDI? Discuss.
4) Discuss the type of foreign capital.
5) Explain the characteristics of Multinational corporation.

Q.9. Answer the following questions (Any two)

1) What is the meaning and scope of Fiscal Policy? Explain.
2) What are the constitutional provisions for the fiscal federalism? Discuss.
3) Write a note on the fiscal federalism in India.
4) Discuss the distribution and allocation of central revenue.

Q.6. Answer the following questions (Any two)

1) Explain the role of finance commission.
2) What are the responsibilities and resources of the centre and of the states?
3) Discuss the term 12th finance commission.
4) Write a short note on the local bodies.
5) Why the 13th finance commission was instituted ? Discuss the recommendations made in the thirteenth finance commission.
6) What is the concept of Parallel economy? Discuss.
7) Discuss the factors responsible for policy failures.
8) What do you mean by the governance of policy economic policy?
9) What do you mean by Parallel economy? Discuss.
10) How will you estimate the black money in India ? Explain.
11) Discuss the factors responsible for generation of Black money.
12) Discuss the concept and features of Bureaucracy. Also examine the role and significance of Bureaucracy in the development.
13) Examine the available delivery mechanism in implementation of economic policies.
14) Examine the need for reforms in the delivery mechanism for implementation of Economic Policies.
15) Suggest measures for bringing about necessary reforms.
16) Discuss the good governance to ensure implementation of economic policy.
17) Explain the role of bureaucracy and delivery mechanism.
18) What are the strategies and policies for administrative reforms? Discuss.
19) Do you think that decentralisation is better alternative to buruaucracy in effective implementation of economic policy ?
20) "An effective delivery system has to ensure People's participation" Comment.

.

B.Tech Civil- IV(Final year) Sem-VIII New CBCS

Professional Elective-IV Advanced Concrete Technology

Question Bank

Each question caries 9 marks

1. Why are chloride-based accelerators not used in pre-stressed concrete structures?

2.Distinguish between plasticizers and superplasticizers.

3.Classify the various concrete chemicals based on their application.

4. List the different types of workability aids.

5.How does a surface-active agent increase workability?

6.Why do super plasticizers perform better than surface-active agents?

7.What method will you adopt to cure concrete in areas of water shortage?

8.What are the different chemicals used to obtain the desired colors on a concrete surface?

9. How are mineral admixtures classified?

10. Distinguish between pozzolanic and/or cementitious admixtures.

11. Discuss the efficacy of the various definitions put forward for workability of fresh concrete.

12What is the relationship between the strength and density of concrete?

13What are the various factors which affect the workability of concrete?

14. Distinguish between segregation and bleeding of concrete.

16. What is re-vibration? Is it detrimental to concrete? Where is it practiced?

17. Why is the age factor not taken advantage of in IS: 456-2000? Comment.

18. Elaborate the maturity of concrete? How is it measured? What are its practical applications in the concrete industry?

19 Describe the importance of curing? When should it be commenced? For how long should it be continued?

20. What is meant by autogenously healing of concrete? Comment on its relevance.

21. Under what circumstances is concrete subjected to fatigue stresses?

22. Is impact strength higher or lower than static strength? Give examples of two cases where concrete is subjected to impact loading.

23 Describe the important fresh state properties of high-strength concrete.

24. Distinguish between the elastic properties of high-strength and conventional concrete.

25. Why is lightweight concrete preferred for constructing partitions in multi-storey buildings? Explain with respect to their physical characteristics of lightweight aggregate concrete.

26. Compare the thermal conductivities of normal-weight and lightweight concretes.

27. What are the reasons for the cracking of concrete and how does it affect durability?

28. What do you understand by carbonation of concrete? How is it tested?

29. Comment on the conditions for sale for ready mixed concrete with respect to product liability.

30. What are the special features of transportation of ready mixed concrete from the plant to the site?

31. How is temperature rise controlled in mass concrete?

32. What is roller-compacted concrete?

33. Distinguish between quality management system and quality control.

34. Describe in detail the damage assessment procedure.

35. How will you assess the effectiveness of repair or rehabilitation executed? Explain.

36. What are the methods for repairing structural components at the element level?

37. What do you understand by the term overlay? Describe different types of overlays used in repair work.

38. What is meant by blanketing? Explain different methods of blanketing.

39. Explain how will you account for the moisture present in sand while mix proportioning.

40. List the methods used for mix proportioning indicating the drawbacks of each method.

41. Explain the importance of the maximum size of aggregate for normal-strength concrete mix design.

QUESTION BANK

CIVIL ENGINEERING DEPARTMENT

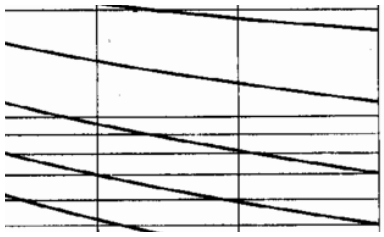
Course-T. Y BTech-Part-II- 2021-22(CBCS)

Subject: Pavement Design (Professional Elective-I)-Semester-II

Sl. No	Questions
1	Explain flexible and rigid pavements and bring out the points of difference
2	Draw a neat sketch of cross section of flexible pavement and explain the function of each component
3	What are the various factors to be considered in pavement design? Discuss the significance of each
4	Explain ESWL and the concept in the determination of the equivalent wheel load
5	The loaded weight on the rear dual wheels of a truck is 5500kg. The center to center spacing and clear space in the dual wheels are 30cm and 10cm respectively. Calculate the ESWL for pavement thickness i) 20cm, ii) 40cm iii) 70cm. Plot semi log paper and also verify the ESWL with log equation.
6	A plate bearing test using 30cm diameter plate carried out on a subgrade which yielded a pressure of 3kg/cm2 after 10 load repetitions at 0.5cm deflection. Design a highway pavement for a wheel load of 5100kg with a tyre pressure of 7kg/cm2.
7	Discuss the application of Burmister's two-layer theory in pavement design.
8	A flexible pavement of thickness 50cm is laid over a subgrade. A circular load of 16cm with uniform contact pressure 7.5kg/cm^2 is applied. Assume the elastic modulus of the subgrade as well as pavement layer to be 800kg/cm^2. Use Deflection Factor chart given in **Fig-I**. Assuming homogenous elastic single layer system determine, a) The deflection of the pavement surface under the center of the load b) The total thickness of flexible pavement using data Design Wheel Load=5000kg, Tyre pressure=6.0kg/cm^2, Elastic modulus=150kg/cm^2 and permissible deflection=0.25cm
9	Plate bearing test conducted with 30cm diameter plate on a subgrade sustained a load of 1500kg at 0.25cm deflection. The test when carried out on a base course of thickness 18cm sustained a load of 5500kg at 0.25cm deflection. Design the pavement section for a wheel load of 5500kg with tyre pressure of 7.5kg/cm2 using Burmister's approach.
10	List and briefly explain the assumptions and limitations of Bousineq's theory.
11	With sketch describe the significance of design wheel load and contact pressure in design

<table>
<tr><th>Sl. No</th><th>Questions</th></tr>
<tr><td></td><td>of pavement</td></tr>
<tr><td>12</td><td>Calculate the design repetition for 20 years period for wheel load equivalent to 2268kg wheel load using the following traffic survey data on a four-lane road.
<table>
<tr><th>Wheel load (kg)</th><th>Average daily traffic ADT in Both directions</th><th>% Of total traffic volume</th></tr>
<tr><td>2268</td><td rowspan="6">Total volume 215 considering traffic growth</td><td>13.17</td></tr>
<tr><td>2722</td><td>15.30</td></tr>
<tr><td>3175</td><td>11.76</td></tr>
<tr><td>3629</td><td>14.11</td></tr>
<tr><td>4082</td><td>6.21</td></tr>
<tr><td>4532</td><td>5.84</td></tr>
</table></td></tr>
<tr><td>13</td><td>Explain a) Radius of relative stiffness b) Equivalent radius of resisting section c) Critical load position</td></tr>
<tr><td>14</td><td>A cement concrete pavement of 25cm thickness is constructed over a granular surface having modulus of reaction 10kg/cm3. The maximum temperature differential between top and bottom of the slab during winter is found to be 15^0c. The spacing between the transverse joint is 7.5m. Find the worst combination of stresses at the edge and corner regions.</td></tr>
<tr><td>15</td><td>Write the step-by-step procedure for the design of concrete pavement as recommended by IRC-58-2015.</td></tr>
</table>

<table>
<tr><th>Sl. No</th><th>Questions</th></tr>
<tr><td>16</td><td>A dual wheel load assembly with 70kN load on each wheel and contact pressure of 0.7kN/mm2 is applied on a homogenous mass with modulus of elasticity 12N/mm2. If the Centre-to-Centre distance between the two wheel is 600mm, determine the deflection value at a depth of 0.5m at four points, at the centre of dual wheels and at radial distance of 300, 600, and 900mm from this centre along the line joining centre of the two-wheel loads. Use deflection factor chart.</td></tr>
<tr><td>17</td><td>Calculate the design repetition for 20 years period for various wheel loads equivalent to 22.68kN wheel load using the following data on a four-lane road.
<table>
<tr><td>Load kN</td><td>22.68</td><td>27.22</td><td>31.75</td><td>40.82</td><td>45.36</td><td>49.90</td><td>54.43</td></tr>
<tr><td>Volume per day</td><td>30</td><td>25</td><td>20</td><td>15</td><td>10</td><td>5</td><td>1</td></tr>
</table></td></tr>
<tr><td>18</td><td>It is proposed to widen an existing 4 lane NH section to 3 lane dual carriageway road.
Design the pavement for new carriageway with following data
Initial traffic in both directions=4932CVPD
Construction period=20 months
Design life=15 years
Design CBR of soil=7%
Traffic growth rate=8%
VDF=4.5
Lane distribution factor=0.75
Pavement Design Catalogue
Plate 2- Recommended Designs for Traffic Range 10-150 msa
<table>
<tr><th colspan="4">CBR 7%</th></tr>
<tr><th rowspan="2">Cumulative traffic (msa)</th><th rowspan="2">Total pavement thickness (mm)</th><th colspan="2">Pavement Composition</th></tr>
<tr><th colspan="2">Bituminous Surfacing</th><th>Granular base and sub-base (mm)</th></tr>
<tr><th></th><th></th><th>BC (mm)</th><th>DBM (mm)</th><th></th></tr>
<tr><td>10</td><td>580</td><td>40</td><td>60</td><td rowspan="5">Base = 250
Sub-base = 230</td></tr>
<tr><td>20</td><td>610</td><td>40</td><td>90</td></tr>
<tr><td>30</td><td>630</td><td>40</td><td>110</td></tr>
<tr><td>50</td><td>650</td><td>40</td><td>130</td></tr>
<tr><td>100</td><td>575</td><td>50</td><td>145</td></tr>
<tr><td>150</td><td>695</td><td>50</td><td>165</td><td></td></tr>
</table></td></tr>
<tr><td>19</td><td>Explain step by step procedure of conducting Benkelman Beam Deflection studies for evaluation of flexible pavement surface condition.</td></tr>
</table>

Sl. No	Questions
20	Calculate wheel load stresses at interior, edge and corner using Westergaard's equations for wheel load=51kN, tyre pressure=0.75N/mm2, E=30kN/mm2, K=0.08N/mm2and slab thickness=250mm
21	What are the various types of joints in C.C pavements? Explain their functions with neat sketches.
22	Determine the deflection values under a wheel load of 60kN and contact pressure 0.7N/mm2 in a homogenous mass of soil at a depth of Z=2.5a up to a radial distance of r=5a. Take modulus of elasticity of subgrade as 8N/mm2. Sketch the deflection curve. Use Deflection curve shown in **Q. 16.**
23	A plate load test was carried out on subgrade using 300mm diameter plate and corresponding to a deflection of 5mm. The load sustained on the plate per unit area was 0.08N/mm2. The test was repeated on the base course of thickness 300mm and unit load sustained was 0.45N/mm2 at the same deflection. Find a) Elastic modulus of subgrade and the ratio EP/ES b) What should be the thickness of base course as to sustain wheel load of 50kN and contact pressure 0.6N/mm2 so that maximum deflection does not exceed 5mm. Use Burmister Two-layer chart. 
24	Explain what is frost action. What are the factors affecting frost action and what are the remedial measures?
25	Existing black top pavement was tested using Benkelman beam. The observations

<table>
<tr><th>Sl. No</th><th>Questions</th></tr>
<tr><td></td><td>recorded at a pavement temperature of 43^0C are given below. Compute the mean deflection, standard deviation and characteristic deflection. The seasonal correction factor=2 rebound deflection values in mm: 1.46, 4.52, 1.56, 1.76, 1.96, 1.74, 1.68, 1.74, 1.96, 1.42, 1.56, 1.62</td></tr>
<tr><td>26</td><td>While conducting BBD studies, the initial dial gauge reading D0, intermediate reading Di and final readings Df obtained at three deflection observation points A and B and C are given below. If the least count of the dial gauge reading is 0.01mm and the value of K of the Benkelman beam is 2.91, determine the rebound deflection values at the three points.
Pont A: 0, 46, 44
Point B: 0, 33, 29
Point C: 05, 60, 59</td></tr>
<tr><td>28</td><td>The BBD studies conducted on a two-lane existing pavement. Design the overlay thickness as per IRC-81 using the data given below: Use Figure-IV for overlay thickness
1. Consider moisture correction factor/seasonal correction factor=1.2
2. Cumulative number of standard axles=100msa

Table-3-BBD Survey Data:
<table><tr><td>Rebound Deflection, mm</td><td>0.85</td><td>0.88</td><td>0.34</td><td>1.58</td><td>0.56</td><td>0.44</td><td>0.44</td><td>0.68</td></tr><tr><td>Pavement Temperature, ^{0}C</td><td>38</td><td>38</td><td>38</td><td>38</td><td>38</td><td>38</td><td>38</td><td>38</td></tr></table></td></tr>
<tr><td>29</td><td>Explain how warping stresses are formed in C.C. pavements. Describe the Westergaard’s equations to calculate warping stresses at critical locations</td></tr>
<tr><td>30</td><td>What are the factors considered in design of rigid pavements? Explain any three factors</td></tr>
<tr><td>31</td><td>Find the vertical stress distribution in a homogenous pavement up to a depth of 60cms. Due to a bullock cart with wheel load 600kg on a vertical plane.
i) Along the line of action of load
ii) 5cm away from the line of action of load</td></tr>
<tr><td>32</td><td>Explain different types of stresses due to wheel loads and equations to calculate</td></tr>
</table>

Sl. No	Questions
33	Using the data given below, calculate the wheel load stresses at i) Interior ii) Edge and iii) corner regions of a cement concrete pavement using Westergaard's stress equation. Also determine the probable location where the crack is likely to develop due to corner loading. Wheel load P=5100kg, E=3x105kg/cm^2, h=18cm, Poisson's ratio of concrete=0.15, K=6.0kg/cm^3 and radius of contact are, a=15cm.
34	Bring out the characteristic differences between flexible and rigid pavements.
35	Describe the step-by-step procedure in design of dowel bars as per IRC-58-2015.
36	What is VDF? Determine the Equivalent Wheel Load Factor or VDF value of the following two axle loads in terms of the standard axle load of 8.16tonne a) LCV with rear axle load of 2.5t b) HCV with rear axle load of 16.5t
37	A flexible pavement of thickness 45cm is laid over a subgrade. A circular load of 15cm with uniform contact pressure 7.5kg/cm^2 is applied. Assume the elastic modulus of the subgrade as well as pavement layer to be 800kg/cm^2. Use Deflection Factor chart given in **Fig-I**. Assuming homogenous elastic single layer system determine, a) The deflection of the pavement surface under the center of the load b) The total thickness of flexible pavement using data Design Wheel Load=5000kg, Tyre pressure=6.0kg/cm^2, Elastic modulus=150kg/cm^2 and permissible deflection=0.25cm
38	If the CBR of the soil used in the upper 500 mm of embankment is 7% and the CBR of the borrow soil used for preparing the 500 mm thick compacted subgrade above embankment is 15%, what is the effective subgrade Modulus/CBR for design of flexible pavement? Consider Poisson's ratio=0.35. Use IIT PAVE software results shown below. Draw a neat sketch.
39	**Design a bituminous pavement as per IRC-37-2018 with granular base and sub-base layers using the following input data.** (i) Four lane divided carriageway (ii) Initial traffic in the year of completion of construction = 6000 cvpd (two-way) (iii) Traffic growth rate per annum = 6.0 per cent (iv) Design life period = 20 years

Sl. No	Questions
	(v) Vehicle damage factor = 5.2 (vi) Effective CBR of subgrade estimated = 7 % (vii) Marshall mix design carried out on the bituminous mix to be used in the bottom bituminous layer (DBM) for an air void content of 3 % resulted in an effective bitumen content (by volume) of 11.5 % viii) Lane Distribution Factor=0.75 ix) Computed horizontal tensile strain using IIT PAVE software=0.0001416 x) Computed vertical compressive strain using IIT PAVE software=0.000234 xi) Consider VG-40 grade bitumen with resilient modulus of 3000 Mpa xii) Poisson's ratio=0.35 Assume trial thickness as below: BC-40mm, DBM-150mm, WMM-250mm and GSB-230mm.
40	Find ESWL at depths of 50mm, 200mm and 400mm for a dual wheel carrying 2500 kN each. The centre-to-centre tyre spacing is 200mm and distance between the walls of the two tyres is 100mm. Use (log) equation to calculate ESWL.
41	Determine the warping stresses at interior, edge and corner of a 28cm thick cement concrete pavement with transverse joints at 5.0m interval and longitudinal joints at 3.5m intervals. The modulus of subgrade reaction K is 6.9kg/cm^3 and radius of loaded area is 15cm. Assume temperature differential during day to be 0.6^{0}C per cm slab thickness (for warping stress at interior and edge) and maximum temperature differential of 0.4^{0}C per cm slab thickness during the night (for warping stress at the corner). Assume e=10x10^{-6}per ^{0}C, E=3x10^5 kg/cm^2, μ=0.15. Use Bradbury chart given in **Figure-III**.
42	A cement concrete pavement is designed for a two- lane two-way National Highway in Gujarat State. The total two-way traffic is 3000 commercial vehicles per day (cvpd) at the end of the construction period. Design parameters are provided in Table AD-1 and traffic axle load spectrum is given Table AD-2 TableAD-1 Design of CC Pavement for Two- Lane Two-Way National Highway Design parameters: Sample G5 (6% CBR-150DLC-3000CVPD

Sl. No	Questions

Table AD-1

Design of CC Pavement for Two- Lane Two-Way National Highway

Design parameters: Sample G5 (6% CBR-150DLC-3000CVPD)

Present Traffic	**=3000 cvpd**
Design life	=20 yrs.
Compressive Strength (fck)	= 56.63N/mm^2 = 566.3 kg/cm^2
Flexural strength of cement concrete (Modulus of rupture)	= 8.15 N/mm^2 = 81.5 kg/cm^2
CBR	**= 6%**
Dry Lean Concrete (DLC)	**=150 mm**
Effective modulus of subgrade reaction of the DLC sub-base (k)	= 24.25 kg/cm^3
Elastic modulus of concrete (E)	= 40417 kg/cm^2
Poisson's ratio (μ)	= 0.15
Coefficient of thermal coefficient of concrete (α)	= 10 x 10^{-6}/°C
Tyre pressure (q)	= 8 kg/cm^2
Rate of traffic increase (r)	= 0.075
Spacing of contraction joints (L)	= 4.5m
Width of slab (b)	= 3.5m
Load safety factor (LSF)	= 1.2
Wheel load (P)	= 8000 kg
C/C distance between two tyres (S)	= 31 cm
Joint width (z)	= 2.0 cm

Table AD-2

Axle Load Spectrum Obtained From Axle Load Survey

Single Axle Loads		**Tandem Axle Loads**	
Axle load class, tons	**Percentage of axle loads**	**Axle load class, tons**	**Percentage of axle loads**
19-21	0.6	34-38	0.3
17-19	1.5	30-34	0.3
15-17	4.8	26-30	0.6
13-15	10.8	22-26	1.8
11-13	22.0	18-22	1.5
9-11	23.3	14-18	0.5
Less than 9	30.0	Less than 14	2.0
Total	**93.0**	**Total**	**7.0**

43	Design a Dowel bar as per IRC-58-2015 using given data below: Slab thickness, h = 350 mm Joint width, z=20mm Modulus of subgrade reaction, k = 80 MPa/m Radius of relative stiffness, l = 1035.3 mm

<table>
<tr><th>Sl. No</th><th>Questions</th></tr>
<tr><td></td><td>E for dowel bar = 2 x 105 Mpa
Modulus of dowel support, k_{mds} = 415000 MPa/m
Wheel load for dowel bar design=66.5kN
Load Transfer=50%
characteristics compressive Strength of Concrete, f_{ck}=40Mpa
Assume Diameter of Dowel bar=38mm, Length=500mm & spacing=300m
First dowel bar is placed at a distance of 150 mm from the pavement edge</td></tr>
<tr><td>44</td><td>Design a Tie bar as per IRC-58-2015 using given data below:
Slab Thickness = 0.35 m
Lane width, b = 3.5 m
Coefficient of friction, f = 1.5
Density of concrete, kN/m3 = 24
Allowable tensile stress in plain bars, Mpa=125
Allowable bond stress for plain tie bars, MPa = 1.75
Allowable bond stress for deformed tie bars, MPa = 2.46
Assume Diameter of Tie bar=16mm</td></tr>
<tr><td>45</td><td>The BBD studies conducted on a two-lane existing pavement. Design the overlay thickness as per IRC-81 using the data given below:
1) Deflection readings and road temperature
<table>
<tr><th>Initial, mm</th><th>Intermediate, mm</th><th>Final, mm</th><th>Pavement Temperature, ^{0}C</th></tr>
<tr><td>1</td><td>0.6</td><td>0.58</td><td>33</td></tr>
<tr><td>1</td><td>0.74</td><td>0.7</td><td>33</td></tr>
<tr><td>1</td><td>0.86</td><td>0.84</td><td>33</td></tr>
<tr><td>1</td><td>0.84</td><td>0.68</td><td>33</td></tr>
<tr><td>1</td><td>0.76</td><td>0.74</td><td>33</td></tr>
<tr><td>1</td><td>0.8</td><td>0.78</td><td>33</td></tr>
<tr><td>1</td><td>0.94</td><td>0.9</td><td>33</td></tr>
<tr><td>1</td><td>0.78</td><td>0.75</td><td>33</td></tr>
<tr><td>1</td><td>0.67</td><td>0.65</td><td>33</td></tr>
<tr><td>1</td><td>0.86</td><td>0.84</td><td>33</td></tr>
</table>
2) Soil Moisture content=10% and consider soil is non-plastic (NP)
3) Cumulative Number of Standard Axles=90 msa
4) Annual rainfall >1300mm
5) Use IRC-81 charts for finding seasonal correction factor and overlay thickness.</td></tr>
</table>

Question Bank

Subject-Civil
(Solid and Hazardous Waste Management) for Class-B Tech III Sem VI (w.e.f.Nov.2020) CBCS

<table>
<tr><td>1.</td><td>Estimate the moisture content of solid waste sample of 100 kg using the following data. (5 marks)
<table>
<tr><th>Sr. No.</th><th>Component</th><th>% by mass</th><th>Moisture content (%)</th></tr>
<tr><td>1</td><td>food waste</td><td>16</td><td>60</td></tr>
<tr><td>2</td><td>paper</td><td>29</td><td>08</td></tr>
<tr><td>3</td><td>cardboards</td><td>08</td><td>05</td></tr>
<tr><td>4</td><td>plastic</td><td>11</td><td>04</td></tr>
<tr><td>5</td><td>grass</td><td>13</td><td>61</td></tr>
<tr><td>6</td><td>wood</td><td>07</td><td>08</td></tr>
<tr><td>7</td><td>metals</td><td>16</td><td>04</td></tr>
</table></td></tr>
<tr><td>2.</td><td>Differentiate between Rural and Urban solid wastes. (5 marks)</td></tr>
<tr><td>3.</td><td>Discuss in detail about the factors affecting the solid waste generation rates. (5 marks)</td></tr>
<tr><td>4.</td><td>Explain the types of waste collection systems based on their mode of operation with a neat sketch. (5 marks)</td></tr>
<tr><td>5.</td><td>Discuss in detail about collection, segregation and disposal of biomedical wastes. (5 marks)</td></tr>
<tr><td>6.</td><td>Discuss the problems associated with E-waste. Describe the management of Ewaste. (5 marks)</td></tr>
<tr><td>7.</td><td>Discuss recycling of E-waste. Also discuss the regulatory aspects of E-waste. (5 marks)</td></tr>
<tr><td>8.</td><td>Solid waste weighing 300 tonnes is used for incineration as per MSW norms. Calculate heat value in kJ/kg by Ultimate analysis method for following constituents of the waste:
Carbon – 190 tonnes
Hydrogen – 20 tonnes
Oxygen – 70 tonnes (5 marks)</td></tr>
<tr><td>9.</td><td>Explain bio gas generation process. Explain the factors affecting their efficiency. (5 marks)</td></tr>
<tr><td>10.</td><td>Discuss various solid waste processing technologies along with their suitability. (5 marks)</td></tr>
<tr><td>11.</td><td>Explain the mechanical and thermal ways and means of reduction of volume of solid wastes. (5 marks)</td></tr>
<tr><td>12.</td><td>Discuss the collection and transfer of solid waste. (5 marks)</td></tr>
<tr><td>13.</td><td>Write short note on shredding of solid waste. (5 marks)</td></tr>
<tr><td>14.</td><td>What is Pyrolysis? In What way is it related to solid waste? What is its characteristics? (5 marks)</td></tr>
<tr><td>15.</td><td>Write a detail note on handling and segregation of wastes at source. (5 marks)</td></tr>
<tr><td>16.</td><td>Explain composting method in detail. (5 marks)</td></tr>
<tr><td>17.</td><td>Explain how effectively solid waste can be managed using 4 Rs (5 marks)</td></tr>
<tr><td>18.</td><td>Write a detailed note on regulatory aspects of E-waste management. (5 marks)</td></tr>
<tr><td>19.</td><td>Explain the regulatory aspects of municipal solid waste management. (5 marks)</td></tr>
<tr><td>20.</td><td>Explain various types of incinerators with a neat sketch. (5 marks)</td></tr>
<tr><td>21.</td><td>Define “hazards” and discuss the characteristics of “hazards”. (5 marks)</td></tr>
<tr><td>22.</td><td>Classify the types of hazards. (5 marks)</td></tr>
</table>

Subject-Civil
(Solid and Hazardous Waste Management) for Class-B Tech III Sem VI (w.e.f.Nov.2020) CBCS

23.	Discus the various qualitative assessment of damage. (5 marks)
24.	Discuss the various types of hazardous wastes. (5 marks)
25.	Illustrate the characteristics of hazardous waste using examples (5 marks)
26.	Enlist and explain the guidelines for storage of hazardous waste. (5 marks)
27.	Describe the various types of Landfills. (5 marks)
28.	Explain the geomorphological hazards. (5 marks)
29.	Discuss the objectives and need of risk assessment. (5 marks)
30.	Discuss the tools of qualitative estimation of damages. (5 marks)
31.	List strategies for waste minimization and elaborate any two. (5 marks)
32.	Illustrate the types of hazardous waste. (5 marks)
33.	Explain the working of landfill with the help of neat diagram. (5 marks)
34.	Discuss the procedure of leachate control. (5 marks)
35.	Analyze the risk assessment plan in case of earthquake. (5 marks)
36.	Explain the need of hazardous waste management rules in India. (5 marks)
37.	Explain the manifesto system in the transportation of hazardous waste. (5 marks)
38.	As a civil engineer, you are allotted a project to improve the condition of waste management in your city. List and explain he parameters you will consider in waste management. (5 marks)
39.	Analyze the risk assessment plan in case of Flood. (5 marks)
40.	Analyze the risk assessment plan in case of landslide. (5 marks)

P.A.H. Solapur University Solapur

Question Bank

Subject: Computer Graphics

Department: Computer Science and Engineering

Class: S. Y. B.Tech. (CSE) Sem-I (New w.e.f. June 2021)

1. What is computer graphics? Explain fundamental elements of computer graphics.
2. How computer graphics is helpful in business applications
3. How computer graphics is helpful in medical applications
4. How computer graphics is helpful in Scientific visualization
5. How computer graphics is helpful in Engineering Analysis
6. Define Pixel, frame buffer, resolution, aspect ratio.
7. Explain the working of refresh CRT
8. Explain beam penetration method
9. Elaborate shadow masking Method
10. Explain LED, LCD and Plasma panel
11. What is touch panel? Explain different types of touch panels
12. Elaborate the steps in DDA line drawing algorithm
13. Explain various advantages and disadvantage of DDA line drawing algorithm
14. Elaborate the steps in Integer Bresenham's Line Drawing algorithm
15. Elaborate the steps in General Bresenham's Line Drawing algorithm
16. Draw flowchart for Bresenham’s Line Drawing Algorithm.
17. Draw flowchart for Bresenham’s Circle Drawing Algorithm.
18. Elaborate the steps in Circle generation algorithm.
19. Consider a line from (0,0) to (5,5) rasterize the line using DDA algorithm
20. Consider a line from (0,0) to (8,5) rasterize the line Integer Bresenham's Line Drawing algorithm
21. Consider the line from (0,0) to (6,5) rasterize the line using general Bresenham's Line Drawing algorithm
22. Consider the origin centered circle with radius 8, generate circle for 1stquad?
23. Explain Run length Encoding technique with an example.
24. What are the advantages and disadvantages of Run Length Encoding?
25. Explain scan converting polygon algorithm

26. Elaborate fence fill algorithm
27. Explain seed fill algorithm
28. Explain flood Fill Algorithm
29. Explain Boundary fill Algorithm
30. Consider the 2D object with the vertices A(1,2) B(3,2) C(4,2) D(4,4).Apply below transformation on the object.
    a. Translate the object 2 units in X-direction and 3 units in Y-direction.
    b. Rotate the object with the angle of 180 degree.
31. Consider the 2D object with the vertices A(4,2) B(4,4) C(4,6) D(2,6).Apply below transformation on the object.
    a. Reflect the object about the line X=0.
    b. Apply X-Shear and Y-Shear on the object with value 2.
32. Consider the 2D object with the vertices A(2,5) B(5,4) C(7,4) D(2,7). Apply Combined transformation on the object.
    a. Rotate the object with the angle of 90 degree.
    b. Reflect the object about the line Y =0.
    c. Scale the object 3 units in X-direction and 3 units in Y-direction.
33. Rotate an object with respect to arbitrary point in 2D
34. Reflect an object through the arbitrary line in 2D
35. Elaborate combined transformation in 2D
36. Homogeneous Coordinate system in 2D Transformation?
37. Describe Scaling in 3D transformation.
38. Explain 3D Translation transformation.
39. Describe 3D Rotation transformation.
40. Describe Reflection in 3D transformation.
41. What is meant by Shearing transformation in 3D? Explain X-shear, Y-Shear and Z-Shear.
42. Consider the unit cube and apply 3D transformation on the cube
    a. Translate the cube with 2 units in X-direction, 2 units in Y-direction and 3 units in Z-direction.
    b. Scale the cube with 3 units in X-direction, Y-direction and Z-direction.
43. Elaborate rotation about an axis parallel to a coordinate axis.
44. Explain about Multiple transformation in 3D
45. How can you identify visible and invisible line segments using Cohen-Sutherland line clipping algorithm?
46. Elaborate working of Mid-point Subdivision algorithm

47. Elaborate segment format with neat diagram.
48. Explain display file compilation in detail.
49. What are the different attributes and states of the segment?
50. Elaborate segment commands
51. Define Segments with simple conceptual model of the display process
52. Explain window and viewport transformation.
53. How Painter's algorithm helps for back-face removal of an object?
54. Elaborate Z-buffer algorithm with neat diagram
55. Explain Warnock algorithm with neat diagram
56. Elaborate quad tree data structure.
57. Define Antialiasing and Explain Increasing Resolution technique.
58. Differentiate between unweighted Area Sampling and weighted Area Sampling
59. What is Halftoning? Explain classical halftoning.
60. Explain about 2x2 and 3x3 Halftoning patterns.
61. Explain dithering and error diffusion patterns
62. What are the different ways to represent curve?
63. Explain Non parametric curve
64. Describe parametric curves
65. What is Space Curve? Explain Circular helix.
66. Explain Cubic Bezier curves with neat diagram.
67. Elaborate various properties of B-Spline curves.
68. Differentiate between Bezier Curve and B-Spline Curve
69. Define fractals and explain about Exactly self-similar Fractal.
70. Explain about Quasi Self Similarity Fractals
71. Explain about Statistically self-similarity
72. Elaborate Sierpinski Triangle with neat diagram
73. Elaborate Koch snowflake with neat diagram

COMPUTER GRAPHICS
S.Y.B.Tech. Sem-I

Question Bank

4 or 5 Marks Questions

1. What is computer graphics? Explain its applications.
2. Define following terms:
    a) Pixel
    b) Resolution
    c) Aspect ratio
    d) Frame buffer
3. Write a short note on Aspect ratio.
4. Elaborate Refresh CRT with neat diagram.
5. Compare raster scan display and random scan display.
6. Describe color CRT monitor with neat diagram.
7. Write a short note on Joysticks
8. Write a short note on touch panels
9. Write a short note on light pens.
10. Write a short note on Beam penetration method
11. Write a short note on Shadow Mask method.
12. What do you mean by rasterization?
13. Describe DDA line drawing algorithm with its advantages and disadvantages.
14. Differentiate between DDA Algorithm and Bresenham's Line Algorithm
15. Explain Generalized Bresenham's Line Drawing Algorithm
16. Describe Run length encoding in detail
17. Elaborate Scan converting polygon.
18. Write a short note on Seed-fill Algorithm
19. Describe 2D Translation with example
20. Describe 2D Rotation with example
21. Describe 2D Reflection with example
22. Describe 2D Shearing with example
23. Describe 2D Scaling with example
24. Translate a polygon with coordinates A(3,6), B(8,11) & C(11,3) by 2 units in X direction & 3 units in Y direction
25. Rotate a point with coordinates A(4,4) with a angle 30 degree.

26. Given a line segment with starting point as (0, 0) and ending point as (4, 4). Apply 30 degree rotation anticlockwise direction on the line segment and find out the new coordinates of the line
27. Given a triangle with points (1, 1), (0, 0) and (1, 0). Apply shear parameter 2 on X-axis and 2 on Y-axis and find out the new coordinates of the object
28. Consider a triangle with vertices A(3, 4), B(6, 4), C(5, 6). Apply the reflection on the X-axis and obtain the new coordinates of the object.
29. Write a short note on Rotation about an arbitrary point
30. Describe Midpoint Subdivision Algorithm
31. Write a short note on Window to Viewport Transformation
32. Summarize Display File Compilation with example
33. Describe Bezier Curve and its properties.
34. Elaborate Painters Algorithm.
35. How Z-buffer algorithm is used in computer graphics?
36. Describe relationship of polygon and window.
37. Describe Quadtree data structure used in Warnock algorithm.
38. Explain Antialiasing techniques.
39. Write a short note on Half Tonning.
40. Describe B-Spline curve and its properties.

<u>7 or 8 Marks Questions</u>

1. Differentiate between Beam penetration and Shadow Mask method.
2. Elaborate DDA Line Drawing Algorithm with suitable example.
3. Consider the line (0,0) to (5,-6). Use Simple DDA to rasterize this line.
4. Consider the line (0,0) to (-8,-4). Use Simple DDA to rasterize this line.
5. Consider the line from (0,0) to (5,5). Use the simple DDA to rasterize this line.
6. Elaborate Bresenham's Line Drawing Algorithm with suitable example.
7. Consider the line from (0,0) to (4,8). Rasterise the line use Bresenham's algorithm.
8. Consider the line from (0,0) to (9,5). Rasterise the line use Bresenham's algorithm.
9. Describe Bresenham's circle drawing algorithm.
10. Describe the Edge Fill Algorithm with example.
11. How polygon is filled using Fence fill algorithm?

12. Consider a triangle with the vertices A(2,2), B(4,2), and C(4,4). Apply Rotation about 90 degree on the triangle and then reflect the triangle about the line y = -x. (Note- Use combined transformation)
13. Consider a polygon with the coordinate A(1,1) B(3,1) C(2,2) D(3,3) and E(1,3). Apply following transformation on the polygon by using combined transformation.
    a) Scale the object by 2 units in X-direction and 2 units in Y-direction
    b) Reflect the object about the line Y=0.
    c) Rotate the object with the angle of 270^0 degree.
14. Consider a cube having the coordinate A(0,0,5) B(2,0,5) C(0,3,5) D(2,3,5) E(0,0,0) F(2,0,0) G(0,3,0) H(2,3,0). Apply 3D Rotation transformation as given below
    a. Perform rotation along X with the angle of 90 degree
    b. Perform rotation along Y with the angle of 180 degree
    c. Perform rotation along Z with the angle of 270 degree
15. Consider a cube having the coordinate A(0,0,5) B(2,0,5) C(0,3,5) D(2,3,5) E(0,0,0) F(2,0,0) G(0,3,0) H(2,3,0). Apply multiple transformations on the cube.
    a) Translate the cube with -2,-2,-2 in X,Y and Z direction respectively.
    b) Rotate the cube along X-axis with angle of 90 degree
    c) Finally perform reflection relative to the XZ plane
16. Explain Cohen-Sutherland Line Clipping algorithm with example.
17. Explain Warnock algorithm in detail.
18. What do you mean by Patterning and dithering?
19. Describe Space curve. Explain Bazier curve and its properties.
20. What do you mean by Fractal line and surfaces? Summarize al 3 types of fractals.

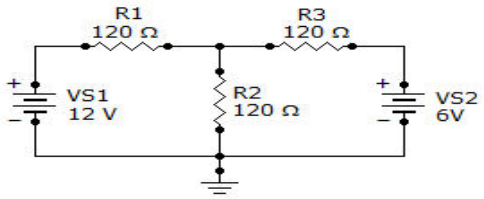
SY B. Tech (Electronics) (Part – I) (CBCS) Examination, 2022

NETWORK THEORY & ANALYSIS

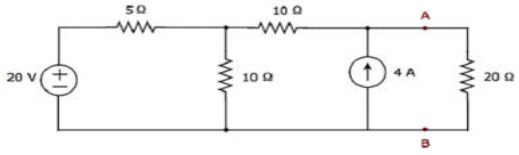
Section I

Q.1) Answer any four of the following (4X4=16)

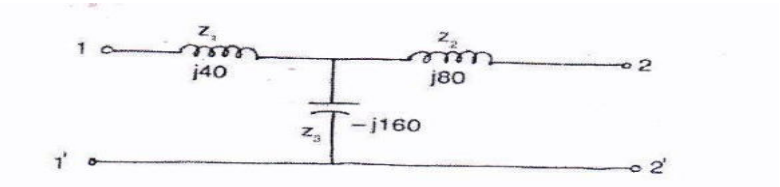
1) Find the current in R_2 of the given circuit, using the superposition theorem.



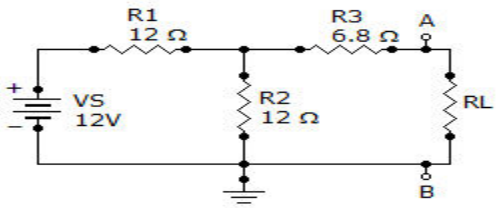
2) Determine the current flowing through 20 Ω resistor of the following circuit using Thevenin's theorem.



3) Derive expression for resonant frequency in series RLC circuit. How the value of R will affect on frequency response.
4) Explain series connection of two port network.
5) Derive ABCD parameters in terms of Z parameters.
6) The Z parameters of two port n/w are Z_{11} =10Ω, Z_{22} = 15 Ω, Z_{12} = Z_{21} =5 Ω. Determine the equivalent T n/w and also determine ABCD parameters.
7) Derive the expression for resonant frequency of a tank circuit.
8) Determine Z parameters of network shown below.



9) Determine Norton's equivalent circuit between terminals A&B from circuit shown in fig.

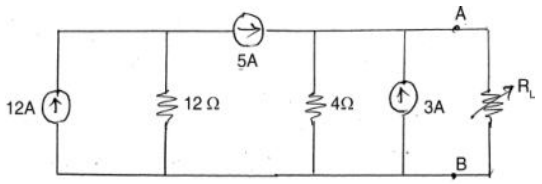


10) Explain parallel connection of two port network.

11) Derive Z parameters in terms of h parameters.

12) Determine the Short circuit circuiting admittance parameters in terms of hybrid parameters.

13) Find the Thevenin's equivalent circuit for the circuit shown between the points A and B.



14) Explain Maximum power transfer theorem and also derive the condition for maximum power transfer theorem for DC circuit.

15) Calculate the value of L at which circuit consisting of parallel connection of two impedances $5+jX_L$ Ω and 10- j12 Ω will resonate at frequency of 1000 rad/ sec.

16) A 100 mH inductor with 500 Ω self-resistance in parallel with a 5nF capacitor. Find the resonant frequency of the combination. Find the impedance at resonance, quality factor of the circuit and the half power bandwidth.

17) By using Norton's theorem, find the current in the load resistor R_L for the circuit shown in fig. a

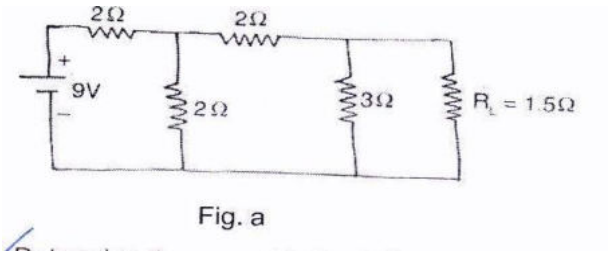


Fig. a

18) Determine Thevenin's Equivalent circuit across terminals A&B from circuit shown below.

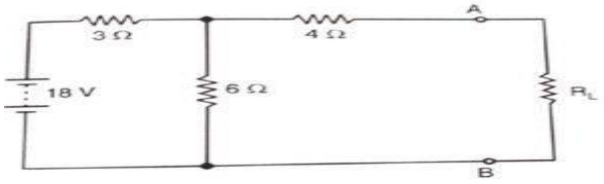
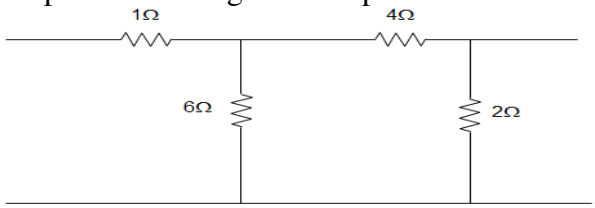
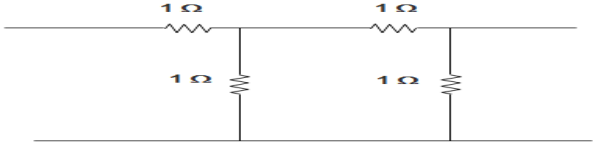


Fig. 22

19) Determine transmission parameters of given two port network.

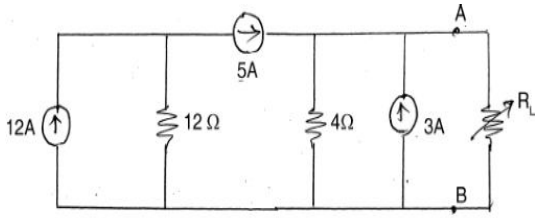


20) Determine h- parameters of given two port network.



Q.3) Answer any Two of the following (2X6=12)

1) Determine the value of R_L for receiving maximum power from source and also find maximum power delivered to the load.



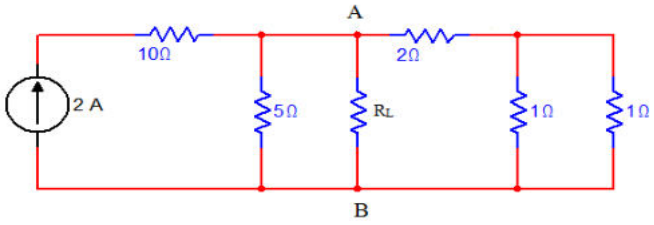
2) A series RLC circuit consists of a 50 Ω resistance, 0.2H inductance and 10 μF capacitor with an applied voltage of 20V. Determine the resonant frequency, quality factor, lower cut off and higher cut off frequencies. Also find bandwidth of the circuit.

3) The port currents for two port network is

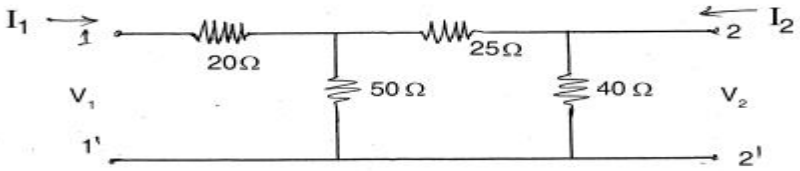
I1 = 2.5V1 – V2

I2= -V1+5V2 Find equivalent π network.

4) Determine the maximum power delivered to the load.

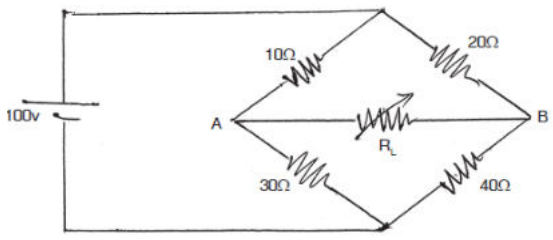


5) Determine short circuit parameters of the network shown in figure below



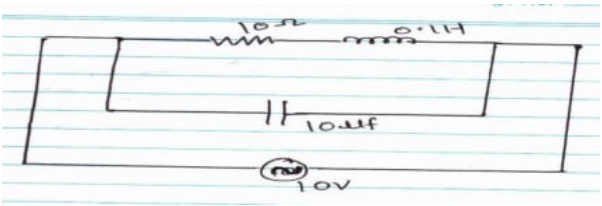
6) Derive the expression for maximum voltage across inductor in series RLC circuit.

7) Determine current passing through R_L=50 Ω using Thevenin's theorem from given circuit shown below.

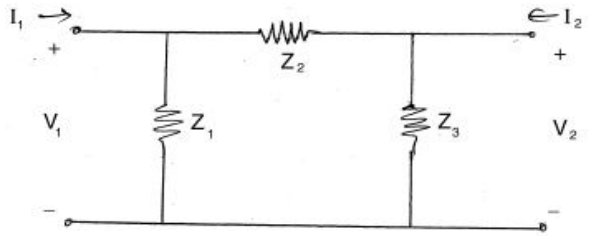


8) Define resonant frequency, bandwidth and quality factor and derive the relationship between them for series RLC resonant circuit.

9) What is parallel resonance? Derive the expression for resonant frequency(fr) of tank circuit. Find f_r for given circuit.



10) Determine the Hybrid parameters for the π -network in the circuit shown Consider Z_1=0.5 Ω, Z_2=1 Ω & Z_3=0.5 Ω.

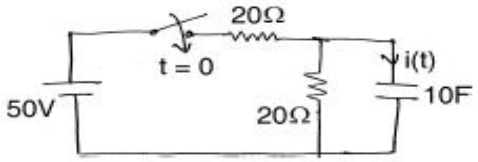


Section II

Q.4) Answer any four of the following (4X4=16)

1) Explain step voltage response for RL series circuit.

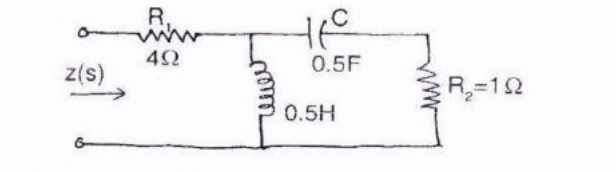
2) Calculate i(t) for t > 0 for the given circuit.



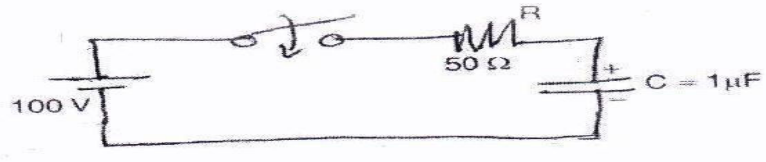
3) Design π type attenuator having 40 dB attenuation with load impedance of 600 Ω.

4) Design constant k type low pass filter (T and π) having cut off frequency of 1 kHz with load resistance of 500 Ω.

5) Calculate the driving point impedance Z(s) of the network shown below. Plot the poles and zeros of the driving point impedance function on S plane.



6) A series RC circuit has R= 50 Ω and C=1μF. The initial charge on capacitor is C=5μF. At t=0, the switch is closed. Find current at t>0.



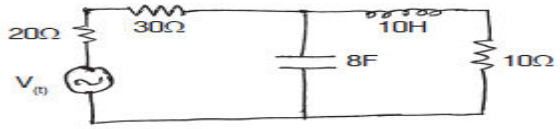
7) Design constant k type High Pass Filter having cut off frequency of 1 kHz with load resistance of 600 Ω.

8) Design **T** type attenuator for attenuation 60 dB with Ro = 500 Ω.

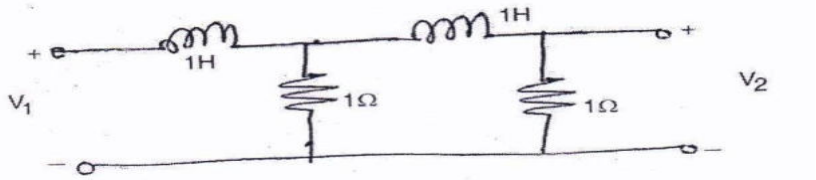
9) Prove that for band pass filter $f_0 = \sqrt{(f1 * f2)}$.

10) Design m- derived low pass filter with a cutoff frequency of 500 Hz, m=0.4 and design impedance of 500 Ω.

11) Determine driving point impedance and driving point admittance for the given circuit.



12) For network shown determine transfer function. $G12 = \frac{V1}{V2}$.



13) Give the definition of pole and zero of the network. Draw pole zero diagram for given network

$$I(s) = 20\,S / (S+5)(S+2)$$

14) Draw pole zero diagram for given network function & hence obtain time domain response.

$$Z(s) = 8S/(S+1)(S^2+4S+4)$$

15) Draw pole zero diagram for given network function & hence obtain time domain response V(t)

$$V(s) = 4S/(S+2)(S^2+2S+2)$$

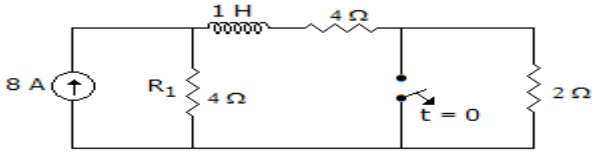
16) What is m-derived filter? What are the advantages of m-derived filters over constant k-type filters? Explain m-derived low pass filter.

17) What are the types of filters and explain characteristics of all filters.

18) For RL circuit, explain step voltage response in detail.

19) What is attenuator? State the purpose for which attenuator is used. Derive relation between decibel and Neper.

20) In figure, the switch has been in closed position for a long time. At t = 0, the switch is opened. Determine the current in R1 at t = 0+.



Q.5) Answer any Two of the following (2X6=12)

1) What are the significance of poles and zeros in network functions? For the transform Current

$$I(S) = \frac{2S}{(S+1)(S+2)}$$

Plot its poles and zeros in S-plane and hence obtain time domain response.

3) Design constant K Band stop filter T and Π Section having cut off frequency of 2 kHz and 6 kHz and a normal impedance of 600 Ω.

4) Design m derived Low Pass Filter T and π section for the given data-cut off frequency 10 KHz, frequency of infinite attenuation 10.1 KHz having design impedance 100 Ω.

5) The series RLC circuit consists of R= 20 Ω, L=0.05 H, C=20 μF with 100 V constant Source, when switch is closed at t=0. Find current i(t) for t>0.

6) Find equation of current i(t) and current at t = 0.5 sec for a given Series RLC Circuit with supply voltage V = 50 V, R = 10 Ω, L = 2H and C = 0.1F Switch is closed at t = 0.

7) For the transform voltage

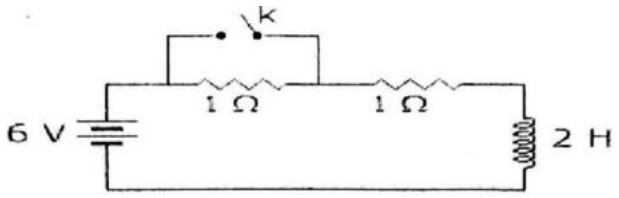
$$V(S) = \frac{5S}{(S+2)(S+4)}$$

Plot its poles and zeros in S-plane and hence obtain time domain response.

8) Design K- type band pass filter having a design impedance of 560 Ω & cut-off frequency of 1 kHz &5 kHz.

9) Design T and Π type attenuator with following specification attenuation: 20 dB, R_0=640 Ω.

10) In the circuit shown in figure, the switch is open for a long time. At t = o the switch is closed. Determine the current supplied by battery at t = o+.



SY. B.Tech (CSE) Sem II
Computer Organization and Architecture

4 Marks question papers

1. How are functional unit of computer connected?

2. What is the role of following levels in computer hierarchy ?
a)logic gates
b) transistors and wires

3. What is the role of following levels in computer hierarchy ?
a)High level language
b) Assembly language

4. What is the role of following levels in computer hierarchy ?
a)Application program
b) Functional units

5. What is purpose of data bus, address bus and control bus?

6. With an example differentiate register addressing mode and immediate addressing mode.

7. With an example differentiate direct addressing mode and indirect addressing mode.

8. With an example differentiate register and register indexed addressing mode.

9.Write the meaning of the following pseudo-ops
.equ
.begin
.end
.if

10.For the following instructions write its description, example and its meaning.
andcc
orcc

11.For the following instructions write its description, example and its meaning.
orncc
jmpl
bneg
bcs

12.For the following instructions write its description, example and its meaning.
ld

st
be
bvs

13. Describe the optimization features and availability features of language for parallelism.

14. Describe the synchronization/communication features and data parallelism features of language for parallelism.

15. Differentiate functional programming model and logic programming model.

16. Define the following terms
    a) Critical section b) Multiprogramming c)Multiprocessing d) Multitasking

17. Differentiate synchronous and asynchronous message passing.

18. How array language extensions and compiler supports data parallelism?

19.Describe pipeline concurrency and divide and conquer concurrency of object oriented programming.

20. Differentiate functional programming model and logic programming model.

21. List and explain the compilation phases in parallel code generation.

22. What are the evolutionary steps of the I/O function?

23. List the characteristics of I/O channels.

24. With neat diagram explain the generic Model of an I/O Module

25. How many classes of hazards are there? Define each one with example.

26. Differentiate linear and nonlinear pipeline.

27. Define the following terms .
Clock, Clock Cycle, Throughput, Clock Skewing and Throughput

28. Describe Instruction-Level Parallelism?

29. What is loop unrolling ? Explain with an example.

30. How many bits are in the (0,2) branch predictor with 4K entries? How many entries are in a (2,2) predictor with the same number of bits?

8 Marks question papers

1. Classify the generations of computers based on technology used in it ?

2. Write the code for the following expression in three address and two address instructions
x=a*b-c

3. Write the code for the following expression in two address and one address instructions
x=a+b*c

4. What is inter process communication? What are the two basic mechanisms of inter process communication? Define multitasking and multiprocessing.

5. List the drawbacks of Programmed and Interrupt-Driven I/O.

6. Describe the following DMA configurations.
a) Single-bus, detached DMA
b) Single-bus, integrated DMA-I/O

7. Define the following data hazards with example.
read after write, write after write and write after read

8.
```
Loop: L.D F0,0(R1)     ;F0=array element
      ADD.D F4,F0,F2   ;add scalar in F2
      S.D F4,0(R1)     ;store result
      DADDUI R1,R1,#-8 ;decrement pointer;8 bytes (per DW)
      BNE R1,R2,Loop   ;branch R1!=R2
```
Show how the loop would look on MIPS, both scheduled and unscheduled, including any stalls or idle clock cycles. Schedule for delays from floating-point operations, but remember that we are ignoring delayed branches.

9. Show what the instruction status look like for the following code sequence when only the first load has completed and written its result:
1. L.D F6, 32(R2)
2. L.D F2,44(R3)
3. MUL.D F0, F2,F4
4. SUB.D F8,F2,F6
5. DIV.D F10, F0,F6
6. ADD.D F6,F8,F2

10. Show what the reservation stations look like for the following code sequence when only the first load has completed and written its result:

1. L.D F6,32(R2)
2. L.D F2,44(R3)
3. MUL.D F0,F2,F4
4. SUB.D F8,F2,F6
5. DIV.D F10,F0,F6
6. ADD.D F6,F8,F2

11.Show what the register status look like for the following code sequence when only the first load has completed and written its result:
1. L.D F6,32(R2)
2. L.D F2,44(R3)
3. MUL.D F0,F2,F4
4. SUB.D F8,F2,F6
5. DIV.D F10,F0,F6
6. ADD.D F6,F8,F2

12. Explain the working of basic structure of a centralized shared-memory multiprocessor based on a multicore chip.

13. Suppose you want to achieve a speedup of 80 with 100 processors. What fraction of the original computation can be sequential?

14. Write a note on directory based protocol and snooping protocol.

15. What are the limitations in Symmetric Shared-Memory Multiprocessors and Snooping Protocols.

16. What are the different types of I/O commands that an I/O module may receive when it is addressed by a processor.

17. What is upward compatibility? How many levels are there in computer?
differentiate high level and low level.

18.Let's see how much the load structural hazard might cost. Suppose that data references constitute 40% of the mix, and that the ideal CPI of the pipelined processor, ignoring the structural hazard, is 1. Assume that the processor with the structural hazard has a clock rate that is 1.05 times higher than the clock rate of the processor without the hazard. Disregarding any other performance losses, is the pipeline with or without the structural hazard faster, and by how much?
19.Draw the basic structure of a MIPS floating-point unit using Tomasulo's algorithm.What is the role of FP adders and address unit ?

20. Differentiate pipeline concurrency and divide and conquer concurrency.

Question Bank

Subject: Electrical Machine-II

CBCS (w.e.f. – June 2021)

Class: S.Y. B.Tech (Electrical) Sem-II

Section I

A. Four Mark Questions:

1. State the classification of AC machines.
2. Describe constructional details of 3 phase induction motor with neat sketches.
3. Calculate the torque exerted by a 50 Hz, 3 phase IM operating with 4% slip which develops maximum torque of 150 kg-m at a speed of 600 rpm. The resistance per phase of rotor is 0.5ohm.
4. The input power to a 3 phase induction motor is 50 kW under certain load. The stator losses are 1.7 kW and mechanical losses are 2.3 kW. If the motor is operating with a slip of 3%, calculate the rotor Cu loss and the efficiency of the motor.
5. A 4 pole, 3 phase induction motor operates from a supply whose frequency is 50 Hz. Calculate: i. the synchronous speed ii. the speed of rotor when the slip is 0.06, iii. the frequency of rotor currents when the slip is 0.04
6. A 50 Hz, 6 pole IM runs at 94.5% synchronous speed developing torque of 120 NM. The mechanical torque lost is 4 Nm and stator loss is 1430 watts. Calculate efficiency.
7. Explain principle of operation of 3 phase induction motor.
8. Explain power stages in 3ph induction motor.
9. Explain the terms cogging & crawling effect of induction motor.
10. Derive Pi : Pc : Pm = 1 : s : (1 – s) where Pi = Rotor input; Pc = Rotor cu loss and Pm = mechanical power developed.
11. A 100 KW, 3300 V, 50 Hz, 3 phase Y-connected IM has NS = 500 rpm the full load slip is 1.8% and full load p.f. 0.85 stator loss = 3500 W rotational loss = 1200 W. Calculate. i. Rotor cu loss ii. The line current iii. The full load efficiency.
12. An 8-pole, 3-phase, 50 Hz induction motor running with a slip of 4% is taking 20 kW. Stator losses amount to 0.5 kW. If the mechanical torque lost in friction is 16.25 N-m, Find: i. BHP ii. Efficiency
13. What is the necessity of starter? Explain with diagram, working and features of star-delta starter for a 3 phase induction motor.

14. A 3 phase cage IM has a short circuit current equal to 5 times the full load current. The full load slip is 0.04. Find starting torque as a percentage of full load torque if the motor is started by
    i. Direct switching to the supply
    ii. Star-delta starter
    iii. An auto-transformer starter
    iv. A resistance in starter circuit.
    v. The starting current in (c) and (d) is limited to 2.5 times the full load current.

15. Explain speed control of induction motor by pole changing method.

16. With neat sketch explain DOL starter & Auto transformer starter.

17. Explain speed control of induction motor by applied voltage.

18. Explain slip power recovery speed control method of induction motor.

19. Explain how the speed is controlled by adding an external resistance in the rotor circuit?

20. Explain induction motor as an induction generator and its limitations.

21. How O.C. (No load Test) & S.C. (Blocked rotor test) data is used to evaluate equivalent circuit parameter of 3 phase IM?

22. Draw and explain equivalent circuit of 3ph Induction Motor.

23. In a double cage induction motor if the outer cage has an impedance at standstill (2 + j1) ohm determine the slip at which two cages develops equal torque if inner cage has impedance of (0.5 + j3.5)ohm at standstill.

24. Explain construction and working of double cage IM. Also explain equivalent circuit of double cage IM.

25. At standstill, the equivalent resistance/phase of the inner and outer cages of a double-cage rotor as referred to stator are (0.4 + j2) and (2 + j0.4) ohm respectively. Calculate the ratio of torques produced by the two cages :
    i. at standstill
    ii. at 5% slip.

B. Six Marks Questions:

1. Explain how rotating magnetic field is created when 3-ph supply voltage is given to the 3-ph stator winding. Give the important assumptions in this case.

2. Explain how rotating magnetic field is created when 2-ph supply voltage is given to the stator winding.

3. Derive the expression for the torque of 3 phase induction motor. Also derive the condition for maximum torque.

4. Derive the expression for the torque of 3 phase induction motor. Also derive expression for starting torque, running torque and maximum torque.

5. A 400 V, 50 Hz, 4 pole, 3 phase star connected IM has per phase stator impedance of Z1 = (0.07 + j 0.3) ohms and per phase rotor impedance referred to stator Z2= (0.08 + j 0.3) ohms. The per phase magnetizing reactance is 10 ohms and resistance representing core loss is 50 ohms. Slip is 4%. Using approximate equivalent circuit, calculate :
    i. Stator current and stator p.f.
    ii. Gross torque iii) Gross efficiency.

6. Draw and explain Slip-torque characteristics of 3 phase induction motor when rotor resistance R2 is varied. Explain the shapes of the curve why are modified in such shapes.

7. 746 kW, 3-phase, 50-Hz, 16-pole induction motor has a rotor impedance of (0.02 + j 0.15) W at standstill. Full-load torque is obtained at 360 rpm. Calculate :
   i. the ratio of maximum to full-load torque
   ii. the speed of maximum torque and
   iii. the rotor resistance to be added to get maximum starting torque.

8. The star connected rotor of a slip-ring I.M. has a standstill impedance of (0.4 + j4) ohm per phase and the external rotor impedance per phase is (6 + j2) ohm. The motor has an induced emf of 80 V between slip-rings at standstill when connected to its supply voltage. Find
   i. Rotor current at standstill with the rotor circuit external impedance in the circuit.
   ii. When the slip-rings are short circuited and motor is running normally with 3% slip.

9. Draw and explain torque-slip characteristics of 3 phase induction motor, state condition for maximum torque and how pull out torque can be changed?

10. Determine the suitable auto transformation ratio for starting a 3ph induction motor with line current not exceeding 3 times the full load current. The short circuit current is 5 times the full load current and full load slip is 5%. Estimate the starting torque in terms of full load torque.

11. Explain Star Delta starter with neat circuit diagram. Derive the relation between the Tst and Tfl.

12. A 3 phase, 420 V induction motor gave the following test readings;
    No load test: 420 V, 1250 W, 9 A
    Blocked rotor test: 160 V, 4000 W, 38 A
    Draw the circle diagram. If the normal rating is 15 kW, find from the circle diagram, the full load value of i) current, ii) power factor and iii) slip. Assume that stator Cu loss is equal to rotor Cu loss.

13 The result of no load and blocked rotor test on 400 V, 36.8 KW, 50 Hz 3 phase, 4-pole I.M. are as under,
    No load test: 400 V, 30 A, 1800 W.
    blocked rotor test : 110 V, 80A, 4000 W. The motor has star connected stator having resistance of 0.1 ohm /phase. Draw the circle diagram and calculate :
    i) Full load current ii) Full load power factor
    iii) Full load speed iv) Full load torque
    v) Full load efficiency vi) Starting torque
    vii) Maximum torque viii) Maximum output power.

14. Draw the circle diagram for a 3.73 kW, 220 V, 50 Hz, 4 pole, 3 phase star connected induction motor from the following test data;
    No load test: 220 V, 5 A, 350 W
    Short circuit test: 110 V, 26 A, 1700 W
    The rotor Cu loss at standstill is half the total Cu loss. Calculate from circle diagram for full load condition i) line current, ii) power factor, iii) maximum torque in terms of full load torque.

Section II

A. Four Marks Questions:

1.	Explain split phase induction motor.
2.	Draw equivalent circuit diagrams of a 1-ph induction motor with and without core loss.
3.	Why 1ph induction motor is not self starting?
4.	Explain capacitor start capacitor run induction motor.
5.	With neat circuit diagram and vector diagram explain capacitor start single phase I.M.
6.	Explain no load and blocked rotor tests of single phase I.M. in detail.
7.	Explain why a single phase induction motor should be provided with an auxiliary winding on the stator.
8.	Explain MMF method for calculation of voltage regulation of an alternator.
9.	Derive an expression for pitch factor and distribution factor.
10.	The effective resistance of a 2000 V, 50 Hz, 400 kVA, single phase alternator is 0.5 Ω. On short circuit, a field current of 40 A gives the full load current of 200 A. The voltage on open circuit with same field excitation is 1160 V. Calculate, i) synchronous impedance and ii) synchronous reactance
11.	A 400 KVA, 3 phase, star connected alternator has a rated line to line voltage of 3300 V. The resistance and synchronous reactance per phase are 0.4 Ω and 5 Ω respectively. Calculate the line value of the emf generated at full load, 0.8 PF lagging.
12.	A 3 ph, 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.04 Wb, sinusoidally distributed and the speed is 380 rpm. Find the frequency and the phase and line emf. Assume full pitched coil & $k_C = 1$.
13.	A 1200 kVA, 3300 V, 50 Hz, three phase star connected alternator has armature resistance of 0.3 Ω per phase. A field current of 40 A produces a short circuit current of 190 A and an open circuit emf of 1100 V (line value). By using synchronous impedance method, find the voltage regulation at full load 0.8 p.f. lagging.
14.	A 60-KVA, 220 V, 50-Hz, 1 ph alternator has effective armature resistance of 0.016 ohm and an armature leakage reactance of 0.07 ohm. Compute the voltage induced in the armature when the alternator is delivering rated current at a load power factor of a) unity b) 0.7 lagging and c) 0.7 leading.
15.	Derive an expression for power developed in Salient pole type alternator and Non salient pole type alternator.
16.	Why synchronous motor is not self-starting? How to make it start? Explain the methods in detail.
17.	Explain V and inverted V curves of a synchronous motor.
18.	With neat sketch, explain phasor diagrams for synchronous motor.
19.	Explain hunting effect of synchronous motor, also write down its causes and remedies
20.	Explain in detail different torques in synchronous motor.
21.	Derive an expression for the power developed by a synchronous motor.

B. Six Marks Questions:

1. Explain principle of operation of 1 ph IM and explain double revolving field theory.
2. How to made single phase induction motor self starting? Explain cross field theory?
3. Draw equivalent circuit of single phase induction motor on double revolving field theory basis.
4. Explain any two types of 1-ph induction motors with their torque slip characteristics.
5. Explain the methods of synchronization of an alternator.
6. With neat sketch explain the construction and working principle of an alternator.
7. A 3-phase star connected alternator supplies a load of 10 MW at 0.85 p.f. lagging and at 11 KV (terminal voltage). Its resistance is 0.1 ohm per phase and synchronous reactance 0.66 ohm per phase. Calculate the line value of emf generated.
8. A 3-phase star connected 1000 kVA, 2000 V, 50 Hz alternator gave following O.C. and S.C. test readings :

Field current	10	20	25	30	40	50
O.C. line V	800	1500	1760	2000	2350	2600
S.C. current	–	200	250	300	–	–

   The armature effective resistance per phase is 0.2ohm. Draw the OCC and SCC and determine the full load percentage regulation at i) 0.8 p.f. lagging & ii) 0.8 p.f. leading.
9. How unidirectional torque is obtained? What is the use of damper winding in synchronous motor? State the various applications of synchronous motor.
10. A 220 V, star connected, 3 phase synchronous motor has a synchronous reactance of 3 Ω/phase and negligible armature winding resistance. At a certain load, the motor takes 7.5 kW at 0.8 pf lagging. If the power developed by the motor remains the same while the excitation voltage is increased by 50% by raising the field excitation, determine i) the new armature current & ii) the power factor.
11. A 2.3 KV 3-phase star-connected synchronous motor has Zs = (0.2 + j 2.2) ohm per phase. The motor is operating at 0.5 power factor leading with a line current of 200 A. Determine the generated emf per phase.

T.Y. B.Tech. (Electronics & Telecommunication Engg.)(Part-II) WEF Oct - 2020

Advanced Mobile Communication

Question Bank

I) Short answering questions

1) Describe Frequency reuse concept.

2) What is micro cell zone concept? Explain its advantages.

3)Explain Handoff strategies in detail.

4) Explain different types of interference in wireless communication.

5) Explain how cell splitting is used to increase the capacity of cellular system.

6) Explain how sectoring is used to increase the capacity of cellular system.

7) Explain how microcell zone concept is used to increase the capacity of cellular system.

8) Write a short note on prioritizing Handoff and practical handoff consideration.

9)Explain small scale multipath propagation in wireless communication

10)Explain different factors influencing the small scale fading

11)Explain Doppler shift with necessary equations.

12) Find the Fraunhofer distance for an antenna with maximum dimension of 1 m and operating frequency of 900 MHZ. If antenna have unity gain calculate the path loss.

13)Define the multipath parameters of

i)Mean excess delay ii)rms delay and iii)Excess delay spread

14) Explain Authontication and security in GSM.

15) Write a short note on SMS in GSM

16) Explain mobile call origination sequence in GSM.

17) Explain mobile call termination sequence in GSM.

18) What is handoff? Explain handoff in GSM.

19) With Time slot data bursts in GSM, explain briefly

20) Explain Dedicated control channels.

21) Explain GSM Common control channels.

22) Explain GSM Broadcast channels

23) Explain GSM control channels

24) Explain GSM radio subsystem in brief.

25) Explain Telephone services, Bearer services and Supplementary ISDN services.

26) Define global system for mobile communication.

27) Explain GSM services and features in detail

28) With neat diagram explain GSM architecture briefly

29) Write various features of CDMA.

30) What is channel assignment strategies explain briefly.

31) Write various features of TDMA.

32) What is co-channel interference ? Explain briefly.

33) Compare FDMA and TDMA.

34) Explain small scale multipath measurements

35) Explain OFDMA.

36) Explain FDMA.

37) Write a brief note on 5G.

38) Explain SSMA.

39) Explain SDMA.

40) Explain 4G/LTE architecture.

II) Long answering questions

1) Describe all the methods used to improve the capacity of cellular system.
2) If a transmitter produces 50 W of power, express the transmit power in units of (a)dBm, and (b)dBW. If 50 W is applied to a unity gain antenna with a 900 MHz carrier

frequency, find the received power in dBm at a free space distance of 100 m from the antenna. What is P_r(10km) Assume unity gain for the receiver antenna.

3) For a given path loss exponent i) n = 4 ii) n = 3 find the frequency reuse factor and the cluster size that should be used for maximum capacity. The signal to interference ratio of 15 dB is minimum required for satisfactory forward channel performance of a cellular system. There are 6 co-channel cells in the first tier and all of them are at the same distance from the mobile.
4) A spectrum of 33 MHz is allocated to a wireless FDD cellular system which uses two 25 KHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses (i) four cell reuse, (ii) seven cell reuse (iii) 12 cell reuse.
5) What is Co-channel interference ? Explain Co-channel interference and system capacity in detail
6) Explain Free space propagation model.
7) Define the three basic propagation mechanisms.
8) Explain ground reflection or two ray model and prove that path difference $\Delta = (2 h_t h_r)/d$.
9) Describe ground reflection or two ray model.
10) Explain Diffraction with Fresnel zone geometry.
11) Explain knife edge diffraction model.
12) Explain multiple knife edge diffraction.
13) What is diffraction and explain briefly? Derive an expression Fresnel Kirchoff diffraction parameter using Fresnel zone geometry.
14) What is small scale fading? Explain in detail different types of small scale fading.
15) Describe Time Dispersion parameters.
16) Describe GSM frame structure in detail.
17) Explain GSM Traffic Channels in detail.
18) Explain GSM frames in detail
19) In the U.S. digital cellular system, if fc = 900 MHz and the mobile velocity is 70 km/hr, calculate the received carrier frequency if the mobile is (a)directly toward the transmitter(positive Doppler shift), (b)directly away from the transmitter(Negative Doppler shift) and (c)in a direction perpendicular to the direction of the arrival of the transmitted signal.
20) Draw the neat diagram of GSM architecture and explain.
21) A normal GSM has 3 start bits, 3 stop bits(also called as trailing bits) 26 trailing bits for allowing adaptive equalization, 8.25 guard bits and 2 bursts of 58 bits of encrypted data which is transmitted at 270.833 kbps in the channel. Find
    (a) number of overhead bits per frame, b_{oh}
    (b) total number of bits/frame
    (c) frame rate
    (d) time duration of slot

(e) frame efficiency

22) Define TDMA system. Also explain efficiency of TDMA frame with important parameters.
23) Draw and explain GSM signaling architecture in GSM.
24) Explain with neat diagram forward channels in CDMA-2000
25) Compare and contrast the features of second generation digital cellular standards-GSM and CDMA technologies.
26) Draw and explain GPRS network architecture in detail.
27) Explain packet and frame format for forward and reverse CDMA IS-95 channels.
28) Explain in detail forward IS 95-CDMA link structure
29) Explain forward CDMA channel.
30) Write a brief note on LTE channels used in 4G network.

PAH Solapur University, Solapur

Class: T.Y. B.Tech - E&TC **Sem: I w.e.f June 2020**

Subject: Digital Signal Processing

Question Bank

1) Draw the block diagram of DSP System
2) Define auto correlation and cross correlation.
3) Calculate the cross correlation of { 1234 }.
4) What is meant by Stability? Mention the condition for the same.
5) What are the different properties of DFT?
6) Derive the equation of circular convolution.
7) Explain the concept of linear filtering.
8) Describe properties of Twiddle factor
9) Differentiate between Circular convolution and linear convolution.
10) Explain The overlap add method.
11) Explain The overlap save method
12) Explain the Divide and Conquer approach for DFT.
13) Draw and Explain DIT FFT algorithm for N=8.
14) Draw and Explain DIF FFT algorithm for N=8.
15) Differentiate between butterfly of DIT FFT and DIF FFT algorithm .
16) Explain the concept of In place computation in FFT..
17) With the help of neat diagrams explain Direct form Realization of FIR Filter.
18) With the help of neat diagrams explain Cascade form Realization of FIR Filter.
19) With the help of neat diagrams explain Direct form I Realization of IIR Filter
20) With the help of neat diagrams explain Direct form II Realization of IIR Filter.
21) With the help of neat diagrams explain Cascade form Realization of IIR Filter.
22) With the help of neat diagrams explain Lattice Ladder form Realization of FIR Filter.
23) Derive the equation of linear phase symmetrical FIR Filter For N odd.
24) Derive the equation of linear phase symmetrical FIR Filter For N even
25) Derive the equation of linear phase ant symmetrical FIR Filter For N odd.
26) Derive the equation of linear phase ant symmetrical FIR Filter For N even.
27) Explain windowing Technique for FIR filter
28) Design FIR Filter.by using Rectangular windows.
29) Design FIR Filter.by using Hamming windows.
30) Design FIR Filter.by using Hanning windows.
31) Design FIR Filter.by using Frequency Sampling Technique..
32) What are Digital Filter?
33) Define Impulse Variant Technique .For IIR Filter.
34) Find the Design equations of. Impulse Variant Technique .For IIR Filter
35) Define Bilinear Transformation .For IIR Filter.
36) Find the Design equations of Bilinear Transformation .For IIR Filter
37) Find the Design equations of Bilinear Transformation .For IIR Filter for Butterworth filter for N=1

38) Find the Design equations of Bilinear Transformation .For IIR Filter for Butterworth filter for N=2
39) Find the Design equations of Bilinear Transformation .For IIR Filter for Butterworth filter for N=3
40) Find the Design equations of. Impulse Variant Technique .For IIR Filter for Butterworth filter for N=1.
41) Find the Design equations of. Impulse Variant Technique .For IIR Filter for Butterworth filter for N=2..
42) Find the Design equations of. Impulse Variant Technique .For IIR Filter for Butterworth filter for N=3.
43) Explain the concept of stability for IIR Filter.
44) .Explain Finite word length effect in case of FIR Filter .
45) . Explain Finite word length effect in case of IIR Filter.
46) Explain the application of DSP in case of Image Processing
47) Explain the application of DSP in case of Speech Processing
48) Explain the application of DSP in case of Communication Engineering.
49) Explain the application of DSP in case of Radar Engineering
50) What are the advantages and disadvantages of DSP System .

Question bank

T.Y. (B.Tech.) (Mechanical Engg.) Sem-I (New w.e.f. June 2020)

Non Conventional Machining

Unit .1		**Overview of Non-conventional Processes**
	1.	How are unconventional machining processes classified?
	2.	Compare conventional and non-conventional machining processes.
	3.	Write the short notes about recent development of unconventional machining process
	4.	Is unconventional machining process an alternate or complement to conventional machining process? Justify.
	5.	Illustrate benefits of unconventional machining process.
	6.	Explain the need for the development of Unconventional Machining Process
	7.	Explain details about unconventional machining process
	8.	Discuss the process selection parameters of unconventional machining process
	9.	Briefly classify the unconventional machining process
	10.	Distinguish between traditional and nontraditional machining process
	11.	Discuss the basic limitations of conventional machining process and justify the need of conventional machining process in now a days.
	12.	Explain Modern machining process and why the unconventional machining process not completely taking over the conventional machining process.
	13.	Briefly Explain under the classification of type of energy and mechanism involved unconventional machining process.

Unit.2		Mechanical Energy Based NCM Processes
	1.	Explain mechanism by which material removal in ultrasonic machining can take place. Discuss effect of process parameters on MRR.
	2.	Describe the construction and working of abrasive jet machining with schematic diagram.
	3.	Discuss the process parameters, applications, and advantages of water jet machining process.
	4.	Explain the functions of Transducer and horns used in USM. List the tool materials used
	5.	Explain the principle of USM. Explain the factors, which influence the MRR in USM
	6.	Explain the working principle, equipments and mechanics of metal removal rate (MRR) of Abrasive jet machining (AJM)
	7.	Compare USM and WJM in terms of process capabilities and limitations.
	8.	Explain Abrasive Water Jet Machining.
	9.	Explain Abrasive Jet Machining.
	10.	Compare Abrasive Water Jet Machining & Water Jet Machining.
	11.	Explain the principle and equipment, mechanics of metal removal rate (MRR), Applications, advantages, disadvantages and Limitations of Abrasive jet machining (AJM)
	12.	Describe the principle and equipment, mechanics of metal removal rate (MRR), Applications, advantages, disadvantages and Limitations of Water jet machining (AJM)
	13.	Discuss the principles, equipments, transducer, tool holders, tools, abrasives, application ,advantages and limitations of Ultrasonic Machining Process (USM)
	14.	Explain the variables affecting the material removal rate and precise quality of abrasive jet machining process
	15.	Write Short Notes on the following related to USM • Functions of slurry and oscillator in USM • Types of abrasives used in USM • Grain size vs machining rate • Importance of Transducer in USM
	16.	Describe Metal removal rate, Tool Materials, Tool Wear Rate and surface finish of ultrasonic machining process (USM)
	17.	Compare USM Process and traditional machining process

Unit.3		Electrical Energy Based NCM Processes
	1.	Explain process characteristics and applications of EDM.
	2.	With the help of a neat sketch, explain the mechanism of material removal in EDM.
	3.	Explain the working principle of wire EDM. Also explain the basic elements of wire EDM Machine.
	4.	With the help of a neat sketch, explain the working and applications of a spark erosion machine.
	5.	Explain how the stratified wire works and Discuss about Recent developments in Wire cut Electrical Discharge machining process
	6.	What are the important process parameters that control the material removal rate in EDM? Explain any four factors
	7.	Explain the following on wire EDM technology: i) Dielectric system ii) Deionized water iii) Positioning system iv) Wire drive system.
	8.	Explain Electric Discharge Machining (EDM)
	9.	What is flushing? Explain different types with its advantages.
	10.	What are the different types of tool materials used in EDM?
	11.	Explain different types of electrolytes.
	12.	Briefly explain the principles, equipments, chemistry of process electrolytes, tools, accuracy and surface finish , process capabilities, applications and advantages of Electrical discharge Machining Process
	13.	Discuss details about process principles, construction and working of EDM, also explain EDM servo system for automatic electrode reefed concept.
	14.	Explain the following Electrical Discharge Machining with neat sketch A. Electrode Feed Control System B. Factors to be considered for EDM Machine tool selection
	15.	Explain the working principle, elements and characteristics of wire EDM process
	16.	Describe the types of pulse generator used in Electro discharge machining process
	17.	With the help of neat sketch explain the mechanism of material removal rate in EDM
	18.	Identify the condition for maximum power delivery to the discharging circuit in EDM
	19.	Write the short notes about

		1.Characteristics of spark eroded surface 2.Working principle of Wire EDM Process
Unit.4		**Chemical and Electro-Chemical Based Unconventional Machining Process**
	1.	Explain different steps involved in Photochemical Machining Process.
	2.	Compare the CHM with ECM with respect to their process parameters.
	3.	Explain the working principle, advantages, limitations and applications of Electro- Chemical Machining Process.
	4.	Compare the mechanical and electrical energy processes in terms of physical parameters, process capabilities and limitations.
	5.	Explain the working principle of electrochemical discharge grinding and discuss the process capabilities and applications.
	6.	Discuss Chemical Machining process with neat sketch and also list out the advantages, disadvantages, applications.
	7.	Discuss about the effect of high temperature and pressure of electrolyte on ECM Process.
	8.	Write a note on Electro-Chemical Grinding Process.
	9.	Explain the ECM process. Explain how a replica of the tool is obtained. Mention the advantages and applications of ECM.
	10.	Explain the working principles, process capabilities and applications of Electro Chemical Grinding Process.
	11.	Explain Photochemical Machining.
	12.	Explain the Electro Chemical Machining process and explain how a replica of the tool is obtained
	13.	Discuss Chemical Machining process with neat sketch and also list out the advantages, disadvantages, applications
	14.	Write Details about types of maskant used in chemical machining process
	15.	Explain the basis of why surface finish of a chemically machined of an alloy is poor
	16.	Describe the chemistry involved ECM Process
	17.	Briefly Discuss about the effect of high temperature and pressure of electrolyte on ECM Process
	18.	Describe the working principles and element of chemical machining process what are the factors on which a selection of resist for use in chemical machining

	19.	Identify the specific advantages of chemical machining process over an electro chemical machining process and mention the practical application Chemical Machining process
	20.	Briefly explain maskants and its types in chemical machining process. Write importance of maskants in CMP
	21.	Briefly explain the principles, equipments, chemistry of process electrolytes,tools,accuracy and surface finish ,process capabilities, applications and advantages of Electro Chemical Grinding Process
	22.	In chemical machining process what are the factors by which the selection of etchants in governed
Unit.5		**Thermal Energy Based Processes**
	1.	With the help of a neat diagram, explain plasma arc machining process mentioning how heating of the work piece takes place in the process.
	2.	Explain the process of Plasma Arc Machining with a neat sketch. State its advantages and applications.
	3.	Explain the working principle, process characteristics and applications of Laser Beam Machining Process.
	4.	Why is EBM carried out in vacuum? Explain the process with a neat sketch.
	5.	Explain the principle of LBM with neat sketch and list out the advantages and disadvantages
	6.	Why is EBM carried out in vacuum? Explain the process with a neat sketch.
	7.	Make a comparison between LBM and EDM on the basis of their application and limitation.
	8.	Explain Laser Beam machining (LBM)
	9.	Explain Beam control techniques for LBM
	10.	Explain Ion Beam machining (IBM)
	11.	Compare LBM & IBM
	12.	Discuss the principles machining system and process capabilities, applications and advantages of Electron Beam Machining with neat sketch
	13.	Explain the principles machining system and process capabilities,

		applications and advantages of Laser Beam Machining
	14.	Describe the principles, equipments, solid state laser; gas laser thermal features applications and advantages of Plasma Arc Machining
	15.	Compare the operation of transferred and non transferred arc mode in plasma machining
	16.	Explain under water plasma cutting
	17.	Describe the unique characteristics of laser machining techniques possesses that make it the only choice for the job.
Unit. 6		**Introduction to Coating Technology**
	1.	Explain Chemical vapor deposition technique. Compare it with Physical vapor deposition.
	2.	Explain chemical vapor deposition in detail.
	3.	Explain plasma spray coating method. Give advantages and applications.
	4.	Explain with neat diagram mechanism of metallic coating in detail.
	5.	Give the applications of coating process.
	6.	Explain Metal Spraying process with advantages and limitations
	7.	Explain Metallic coating process with advantages and limitations
	8.	Explain Plasma flame spraying process with advantages and limitations.
	9.	Discuss scope of surface coating technology in Engineering field
	10.	Explain with neat diagram mechanism of metallic coating in detail.
	11.	Give the different name of metallic coating and explain any one technique
	12.	How can we measure the thickness of coating? Explain any one technique in short.
	13.	What is Plasma? Discuss the Plasma spray coating Process and compare with thermal spray coating.
	14.	Define vapour deposition and Explain physical vapour deposition

		coating technique.
	15.	Explain sputtering method of Physical vapour Deposition.

Computer Science and Engineering

Subject: Software Engineering

Class: T.Y. B.Tech(CSE) (CBCS)

Sem- I

Section-I

1) Define Software Engineering.

2) What are the Advantages of incremental model?

3) Describe the problem domain in software engineering.

4) What are the different characteristics of software process?

5) Describe waterfall model used in software engineering.

6) Describe prototype model used in software engineering.

7) Describe spiral model used in software engineering.

8) Describe phased development processes in software development.

9) What is the need of SRS?

10) What are the different components of SRS?

11) Describe functional specification with Use Cases.

12) What is DFD? Give suitable example.

13) Describe entity relationship diagram with suitable example.

14) How design principles used in function and object oriented design.

15) What is coupling? Describe all types of coupling used in design.

16) What is agile project management? Explain adaptive project management life cycle in detail.

17) Describe unit and integration testing in detail.

18) Describe black box testing and its types used in testing of software.

19) Describe white box testing and its types used in testing of software.

20) What is the role of software architecture in software engineering?

Section-II

21) Describe user satisfaction testing in detail.

22) What is cohesion? Describe all types of cohesion used in design.

23) Describe Component & Connector View along with suitable example.

24) What is Open Closed Principle used in software design?

25) Describe function-oriented design in detail.

26) Describe object oriented design in detail.

27) How the Inspection and audit process is applied in project management?

28) What is software configuration management process?

29) How effort estimation can be done software engineering?

30) Describe CMM project management process in detail.

31) Describe risk management planning with suitable examples.

32) What is agile project management? Explain iterative project management life cycle in detail.

33) Describe the Science of Scrum in detail.

34) What are the new management responsibilities in agile project management?

35) Describe adaptive & integrating the APM toolkit used in agile project management.

36) How project monitoring plan can be used in project planning.

37) Differentiate Verification and Validation with v-shaped model.

38) With neat block diagram explain rational unified process model used in software development.

39) With neat block diagram explain time boxing model used in software development.

40) What is requirement process?

41) Describe requirements specification in detail.

42) Describe Agile process model in detail.

43) How Conceptual Design and technical design used in software design.

44) What are module level concepts used in object oriented design?

45) Explain structured design methodology.

46) Describe requirement change management in software project.

47) What is project management process?

48) Describe about quality concept in software project.

49) Explain Class diagram, data flow diagram, sequence diagram in detail.

50) Differentiate between waterfall model and agile model.

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Class: T.Y. B.Tech - E&TC **Sem: II w.e.f June 2020**

Subject: Antenna and Wave Propagation

Question Bank

1) Name the different antenna parameters and define any five of them.
2) Define Effective aperture, effective height, radiation resistance, front-to back ratio of antennas.
3) Define antenna beam width, antenna bandwidth, antenna beam efficiency, antenna beam area or beam solid angle, antenna temperature.
4) What is meant by Antenna efficiency? How it is related with radiation resistance?
5) What are the different factors on which radiation resistance depends on?
6) Derive the power radiated and radiation resistance of a current element.
7) Explain various antenna field zones and their boundaries with neat sketches.
8) Describe and define the antenna parameter, which is a measure of the match between the antenna and the transmission line.
9) Differentiate between antenna and transmission line.
10) Explain the term radiation resistance. What is its value for a quarter wave monopole?
11) What are the reasons for effective height of an antenna?
12) Distinguish between Half Power Beam Width (HPBW) and Beam Width between First Nulls (BWFN).
13) What is meant by "beam width"? How it is related to directivity of an antenna?
14) What is retarded potential in a magnetic field? Derive expression connected and state its importance.
15) Differentiate between device gain (power) and Antenna (Directive) gain.
16) With the help of neat diagrams explain the principle of radiation in antennas.
17) Write a note on radiation pattern and radiation lobes.
18) Explain the experimental set up for the measurement of the radiation pattern of an antenna.
19) Describe how the radiation pattern and gain of a given antenna can be measured experimentally.
20) Differentiate half wave dipole from quarter wave monopole. Deduce its radiation resistance.
21) Explain the radiation principle of a monopole antenna.
22) Explain the development of monopole and dipole from transmission line. Obtain the radiation resistance of half wave dipole antenna.
23) What is reciprocity theorems applied to antennas?
24) Explain the measurement procedure for directional pattern and polarization.
25) How will you measure gain of an Antenna under Test (AUT) if two more antennas are provided with one of them a standard reference antenna with known gain?
26) How will you measure polarization of an Antenna under Test (AUT).
27) Explain radiation pattern multiplication with a neat sketch.
28) What are smart antennas? Why the antennas are called smart?

29) Define pattern multiplication and derive for the Array factor of n-isotropic point sources.
30) Find the equations of field radiated by a broadside array of 'n' isotropic sources. Also find the beam width of the major lobe.
31) Explain the condition for end-fire radiation.
32) What is the need for antenna array? Explain with the types.
33) Differentiate Broadside Array and End fire Array. Obtain the expressions for 3 dB beam width for both Broadside Array and End fire Array.
34) Explain an end fire array antenna?
35) Define End fire Array antenna. How will you design an End fire array? Derive the equation for directivity of an End fire Array.
36) What is meant by a broadside array? How will you design a broadside array? Derive the equation for directivity of a broadside.
37) Define and explain array factor.
38) What is a parabolic reflector? State its structure and explain different methods of feeding.
39) Explain the working of Horn antenna. Explain different types of horn antenna.
40) Draw the block diagram of a basic smart antenna system and state its features.
41) Explain Reflector antennas and their feed systems
42) Explain how we can select the antennas based on frequency of operation.
43) Explain the working of Micro strip antenna.
44) Draw structure of a micro-strip antenna. Give its advantages and disadvantages.
45) What are the different modes of operation of helical antennas?
46) What are the various effects of antennas heights?
47) Explain the working of Yagi Uda Antenna. Discuss about the lengths of reflectors and directors
48) Explain the working of Log periodic antenna.
49) Explain about fading and diversity reception.
50) Explain briefly about ground wave and sky wave propagation. Calculate the field strength at distance due to ground wave.
51) Explain the factors involved in the propagation radio waves.
52) Explain the structure of ionosphere. Derive the characteristics equations of the ionosphere.
53) Explain the mechanism of bending of the electromagnetic waves by the ionosphere. How is this wave bending used in telecommunication?
54) What is duct propagation? Explain the formation of ducts and describe different types of ducts.
55) Explain how the problem of fading is solved.
56) What are the various ionospheric layers? Sketch the paths traced by electromagnetic waves incident in these layers at different angles.
57) Distinguish between critical frequency and maximum usable frequency.
58) Write a relation which shows how virtual height critical frequency and skip distance are related.
59) Explain the terms- virtual height critical frequency and skip distance.
60) Explain how an EM wave is reflected and propagated from earth. State its significance

61) Explain what is meant by critical frequency in wave propagation. State its importance. How it determined?
62) Differentiate between Ground wave propagation and Space wave propagation.
63) What is skip distance in ionospheric propagation?
64) What is the difference between slot antenna and its complementary antenna?
65) Describe Flat sheet and corner reflectors and derive their field equations.
66) 4 sources have equal magnitude & are spaced $\lambda/2$ apart. Maximum field is to be in line with sources. Plot the field pattern of the array.
67) Obtain the pattern of two isotropic point sources with identical amplitude and in phase quadrate currents, and spaced (i) one-half wavelength, (ii) quarter wavelength apart.
68) Describe the troposphere and explain how ducts can be used for microwave propagation.
69) i). Describe the Tropo-scatter propagation. ii). Explain the effect of Earth's magnetic field on ground wave propagation.
70) Describe the theory of propagation of Electromagnetic wave through the ionosphere in the presence of external magnetic field and show that the medium acts as doubly refracting crystal.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Third Year B.Tech. (Electronics & Telecommunication Engg.) (Part –II)
CBCS Pattern

Question Bank for Embedded Systems

Section- I

Q2) Solve any four of the following: (4*4=16 M)

1) Describe the Hardware and software design for ES
2) Explain the Characteristics of Embedded system.
3) Explain Embedded System Design Challenges
4) Explain with example pipelining concept of ARM
5) Explain the concept of PLL in LPC2148
6) Explain the concept of WDT in LPC2148
7) Explain the Concept of RTC in LPC2148
8) Draw and explain the data flow model of ARM
9) State the features of LPC2148. Draw its architecture.
10) Describe working of ADC in LPC2148.
11) What is mean by cache memory? Explain in brief.
12) Explain recent trend in Embedded System.
13) Define Embedded System. Write Different Applications of ES.
14) Draw & Explain Hardware architecture of Embedded System
15) What are different applications of Embedded System
16) Explain the concept of interrupt controller for LPC 2148
17) Explain Bus Architecture in ARM 7
18) State Chip peripherals of ARM2148. Explain function of each in detail.
19) Whether pipeline is supported by LPC2148? If yes how many stages of pipelining is used. Describe function of each stage.
20) Explain with examples Arithmetic and Logical instructions used in LPC2148.

Q 3) Solve any two of the following: (2*6=12 M)

1) What do you mean by Design metric? Explain the following Design Metric a) Power b) Time to Market c) Safety d) NRE Cost
2) Draw and explain the architecture of typical ARM7 controller LPC 2148
3) Describe the operation of following instructions with example a) TEQ b) MLA c) BLX d) STM e) LDRB
4) What are operating modes of ARM7 processor? Explain changing mode on exception for ARM7
5) Describe the operation with example of following ARM instruction
   a) LDR b) BX c)MOV d) MLA e) SUB
6) Explain three Stage Pipeline concepts in ARM7 Processor?
7) Explain the Concept of Peripherals in the LPC2148- a) Timer /Counter b) ADC
8) Explain Exception, Interrupt vector Table of ARM Processor. What is TCM?
9) Describe the operation of the following ARM Instruction
   a) LDRB b) CMN c) LSL d) MLA e) BX
10) Explain the Following on Chip peripherals of ARM2148 in detail
    RTC , WDT, PLL

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Third Year B.Tech. (Electronics & Telecommunication Engg.) (Part –II)
CBCS Pattern

Question Bank for Embedded Systems

Section-II

Q4) Solve any four of the following: (4*4=16 M)

1) Write 'C' code & draw interfacing diagram of LED interfacing.
2) Draw interfacing diagram of Relay to LPC2148 and write an embedded C Program to change relay switch from NO to NC continuously.
3) Interface 8 LED's to LPC2148 port pins P0.0 to P0.7. Write an embedded C program to blink them alternately after some delay.
4) Draw and explain the interfacing of LED with ARM _Processor
5) Explain with code interfacing of relay to lpc2148 in details
6) Explain queue, mailbox & Pipes
7) Describe concept of semaphore with example
8) Function related to pipes used for IPC
9) Kernel services in RTOS
10) Explain Event Register and ISR kernel objects.
11) Explain kernel Structure of U Cos-II RTOS.
12) What are the features of µcos-II RTOS?
13) Explain Round Robin Architecture. State its Advantage and disadvantage.
14) What is Task Scheduling? Explain the various task Scheduling algorithms.
15) Applications of RTOS
16) Explain task states in RTOS. Explain memory management in µ cos II RTOS
17) What is RTOS? Explain Classification of RTOS?
18) Interface two LED's with LPC2148. Draw interfacing diagram and write code along with flowchart.
19) Compare various scheduling algorithms.
20) Explain mobile internet Device

Q 5) Solve any two of the following: (2*6=12 M)

1) Interface a stepper motor with LPC2148 for the following specifications
   i)The motor is connected to port pins P0.4-P0.7
   ii) Rotate motor in clockwise direction
2) Draw the block diagram of interfacing of input device as keyboard with ARM processor.
   Also draw block diagram of interfacing of LCD with LPC2148. Explain in detail.
3) Interface Stepper Motor with LPC2148 with following specification
   a) The motor is connected to port pins P0.0,P0.1,P0.2,P0.3
   b) Rotate in Clockwise Direction
   c) Draw a net Diagram and embedded C Program.
4) Draw interfacing Diagram of 16X2 LCD with LPC2148.write an Embedded C Program to display "Embedded System "on LCD
5) Explain with code the interfacing of DAC to lpc2148 in detail.
6) Explain digital camera as an embedded system
7) Explain mobile internet devices as an embedded system
8) Explain Block Diagram of Mobile Phone
9) What is the state of task? Draw and explain the characteristics of each task state? Explain with Diagram task Control Block
10) Interface 8 LED's to LPC2148 port pins P0.0 to P0.7. Write an embedded C program to blink them alternately after some delay.

Punyashlok Ahilyadevi Holkar Solapur University,Solapur
Department Electrical Engineering
Class :- T. Y. B. Tech. (EE) Sem-II

Subject : Advanced control system

Question Bank (ACS)

1. Explain the design steps for of lag – Lead compensator by root locus/ bode plot.
2. Consider unity f/b system with OLTF k /s(s+1) .it is specified that
   k_v =12 sec^{-1} and PM =40˚Design the suitable lead network for the system.
3. A unity f/b type 1 system has OLTF G(S)= k / s(1+s)(0.2s+1) . Design the suitable lag network for the system to meet following specifications.
   k_v =8 sec^{-1} and ii) PM =40˚
4. Explain the design steps for Lead compensator by root locus.
5. Explain the design steps for Lead compensator by bode plot.
6. Explain realization of Lead compensator
7. Explain realization of lag –Lead compensator
8. Explain realization of lag compensator
9. Consider the system having transfer function g(s)= k / s(s+1) with unity feedback.Design a lead compensator to meet following specifications.
   Damping ratio= 0.7 ii. Settling time =1.4 sec iii.Kv ≥ 1.25
10. Define 1.state variable.2.state space 3.state vector 4. state trajectory
11. Discuss the advantage of state space techniques over the transfer function techniques of analyzing the control system.
12. Obtain state model for the system described in phase variable form.

    $d3y / d t3 + 11\ d2y / d t2 + 4\frac{dy}{dx} + 8y = 9\ u(t)$

13. A system is represented by the following state and output equations. Find Transfer function of the system.

    a) $\dot{x}(t) = \begin{vmatrix} 0 & 1 \\ -2 & -3 \end{vmatrix} x(t) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} U(t)$; $Y = [\,1 \quad 0\,]\ x(t)$

14. Obtain state Transition matrix whose system matrix is given by

    a) $A = \begin{vmatrix} 0 & 1 \\ -4 & -5 \end{vmatrix}$

15. Find the state space representation of simple mechanical system.
16. Find the state space representation of simple electical system.
17. What is lag compensator ? Obtain Transfer function of the lag compensator and draw pole zero plot.
18. Consider the lag lead compensator Gc (s) = Kc (S+ 1/T1)(S+ 1/T2) / (S+ β/T1)(S+1/BT2) Show that at a frequency ω_1, where

$\omega_1 = 1/(T1T2)^{1/2}$ the phase angle of Gc ($j\omega$) becomes zero.

19. A unity f/b system has OLTF 4 / s(2s+1).it is desired to have PM of 40° without sacrificing the k_v of the system. Design the suitable lag network for the system.
20. A system is represented by the following state and output equations. Find Transfer function of the system

$$\dot{x}(t) = \begin{vmatrix} -2 & -3 \\ 4 & 2 \end{vmatrix} x(t) + \begin{matrix} 3 \\ 5 \end{matrix} U(t) \quad ; \quad Y = [\,1 \quad 1\,] \quad x(t)$$

21. Obtain state Transition matrix whose system matrix is given by

$$A = \begin{vmatrix} -3 & 1 \\ -2 & 0 \end{vmatrix}$$

22. Define The terms 1.state variable. 2.state space 3.state vector 4. state trajectory
23. Derive the expression for transfer matrix
24. Write the properties of state transition matrix.
25. Find the state space representation of simple mechanical system.
26. Test the controllability & observability of the system whose state space representation is given as,

$$\begin{bmatrix} \dot{X}_1 \\ \dot{X}_2 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 1 \end{bmatrix} \begin{bmatrix} U_1 \\ U_2 \end{bmatrix}$$

$$\begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} = \begin{bmatrix} 1 & 1 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix}$$

27. Obtain the state moel for the simple series RLC circuit. Consider output across Capacitor.
28. Explain the different methods for calculation of state feedback gain matrix.
29. Explain the proceure of Ackerman's formula o find state feedback gain matrix.
30. Explain the proceure of Direct substitution method to find state feedback gain matrix.
31. Explain the full order state observer
32. Derive the expression for transfer unction of full order state observer
33. Explain the digital controller
34. Explain isocline method for phase trajectories.
35. Explain common physical nonlinearities
36. Explain in short jump resonance.
37. Explain singular points in nonlinear control system.
38. Explain delta method for phase trajectories.
39. Explain in short saturation and deadzone nonlinearities.
40. Derive describing function of saturation and deadzone .

41. Explain stability of nonlinear system.
42. Explain in short limit cycle
43. Derive pulse transfer function of cascaded elements
44. Explain in short mapping between s-plane and z -plane.
45. Derive pulse transfer function of cascaded elements.
46. Examine the stability of the system given by equation below.
    $Z^5+Z^4+2Z^3+2Z^2+3Z+5=0$
47. Examine the stability of the system given by equation below.
    $Z^7+9Z^6+24Z^4+24Z^3+24Z^2+23Z+15=0$.
48. Explain impulse sampling and data hold
49. Derive pulse transfer function of closed loop systems.
50. Derive transfer function of zero order hold.
51. Explain the different methods for stability of digital system.
52. Explain the Bilinear transformation method for stability.
53. A system is characterized by the following state space equations:
54. X1 • = -3 x1 + x2
    X2 • = -2 x1 + u
    Y = x1
    Find the transfer function of the system and Stability of the system.
55. Compute the STM of system above
56. Derive the expression for the transfer function from the state model.
    X• = Ax + Bu and y = Cx + Du
57. Find the state model of the system whose differential equation is
    $y''' + 2y'' + 3y' + 4y = u$
58. A system is represented by the following state and output equations
    Derive Transfer function of the system

$$\dot{x}(t) = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} x(t) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} U(t) \;;$$

$$Y = \begin{bmatrix} 1 & 0 \end{bmatrix} x(t)$$

59. Test the controllability and observability of a control system which is represented in the state space model as

$$\dot{x} = \begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -1 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} [u]$$

$$Y = \begin{bmatrix} 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

60. The state equations are given below

    $\dot{x}1 = x2$;

    $\dot{x}2 = x3$;

    $\dot{x}3 = -8x1-14x2-7x3+u$

    The desired closed loop poles of controller are to be located at s = -5, s = -6 and s = -7. Determine the state variable feedback gain matrix.

61. The closed-loop poles (eigenvalues) are to be located at s = -3, s = -7. Design a controller using state variable feedback. Given that

$$A = \begin{bmatrix} 0 & 1 \\ -20 & -9 \end{bmatrix} \quad \text{and } B = \begin{bmatrix} 0 \\ 1 \end{bmatrix},$$
$$C = [1 \quad 0].$$

62. The matrices of a system are given below

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \text{ and } B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}.$$

    The poles (eigenvalues) of the system are to be located at s = -1.5, s = -2.5 and s = - 4

    Design a controller using state variable feedback.

63. Consider the system $\dot{x} = Ax$, $y = C x$

$$A = \begin{bmatrix} -1 & 1 \\ 1 & 2 \end{bmatrix}$$
$$\text{And } C = [1 \quad 0]$$

Design a full order observer. The desired pole locations for the observer matrix are -5 , -5

64. Illustrate the Basic elements of discrete data control system with neat diagram.

65. Examine the stability of system by Jury's test.

$$\mathbf{Z^4 - 1.2\,Z^3 + 0.07\,Z^2 + 0.3\,Z - 0.08 = 0}$$

66. Examine the stability of the system given by equation , by Jury's test

$$\mathbf{Z^5+Z^4+2Z^3+2Z^2+3Z+5=0.}$$

67. Examine the stability of the system given by equation , by Jury's test

$$\mathbf{Z^7+9Z^6+24Z^4+24Z^3+24Z^2+23Z+15=0}$$

Department of Electronics Engineering
T.Y. (Electronics) Part I
Question Bank

Sub.: Microcontrollers

UNIT 1 : Fundamentals of Microprocessor

1) List the three buses found in computer systems and state briefly the purpose of each bus.
2) What is the purpose of program counter, stack pointer and instruction decoder?
3) How computer is internally organized and works?
4) How memory is organized?
5) Compare the memories RAM, SRAM, and DRAM.
6) Compare the memories ROM, PROM, and EPROM, EEPROM and Flash memory.
7) Compare microprocessor and microcontroller.
8) What is timing diagram? Draw the timing diagram for memory read and memory write operation for microprocessor 8085.
9) If address and data pins are multiplexed, how to de-multiplex? What is need of this de-multiplexing ?
10) For any computer, data bus is bidirectional and address bus is unidirectional. Why?

UNIT 2 : The 8051 Architecture

1. Compare RISC and CISC architecture
2. List out the features of 8051.
3. What are the different registers and their purpose in 8051 microcontroller?
4. Define addressing mode. Explain the different addressing modes in 8051 with suitable example.
5. How PUSH, POP, XCH, XCHD, DJNZ instructions of 8051 works?
6. What are the bit manipulation instructions in 8051?
7. Write a program for finding even and odd numbers form a given array of 10 elements.
8. Write a program for finding a largest number form a given array of 10 elements.
9. Draw and explain memory organization in 8051.
10. Show the status of the CY, AC and P flag after the addition of 88H and 93H in the following instructions.

    MOV A, #88H
    ADD A, #93H
11. Write 8051 program to sort a given array in ascending order.
12. Compare LJMP, SJMP and AJMP

13. Write a program to add five BCD numbers stored from 50h. Store the BCD result from 60h.
14. A switch is connected to P1.7. Write a program to send FFh to P2 when switch is closed else send 00h to P2.
15. Why are the program counter (PC) and data pointer (DPTR) registers of 8051 16-bit wide, whereas the 8051 stack pointer register is 8-bit wide only? Justify.
16. What happens in the following instructions?
    a) Here: SJMP Here b) MOV SP, #74 c) JZ FEh
    d) JC 02 e) INC @R3 f) DEC 51h
    g) CPL 91h
17. When it is required to use the control signals WR and RD?
18. Differentiate MOV, MOVX, and MOVC instructions with examples.
19. Write a program to add respective elements of two arrays of ten elements.

UNIT 3: 8051 On-chip Peripherals

1. What are the functions of the following 8051 pins?
   ALE EA PSEN T0 RST TXD XTAL2
2. Draw and explain the bit format of PSW register in 8051.
3. List the interrupt sources in 8051. Write their causes, flag affected, and vector address.
4. How to enable/disable the interrupts in 8051? Explain with respective SFR.
5. How to change the default interrupt priority in 8051? Explain with respective SFR.
6. How RETI and RET instructions differ.
7. What is the difference between the operation of timer and counter in 8051?
8. Draw and explain the bit formats of TMOD and TCON registers.
9. What are the modes of operation of Timer in 8051.
10. Write an 8051 program to toggle pin P1.0 continuously every 250ms. Use Timer1, mode 1 to create the delay. Assume XTAL= 11.0592MHz.
11. Write an 8051 assembly and C program to generate a square wave of 50 Hz frequency on pin P2.3. Assume XTAL= 11.0592MHz. Use Timer interrupt.
12. Program Timer 0 to generate a square wave of 0.5 KHz.
13. Program Timer 1 to generate a square wave of 10 KHz.
14. How can an external frequency be measured using the 8051?
15. A switch is connected to pin P1.2. Write a C program to monitor the switch (SW) and create the following frequencies on pin P1.7:
    If SW=0 500 Hz else 750 Hz. Use Timer 0in mode 1 for both of them.
16. Program Timer 1 to be counter. Use mode 1 and display the binary count on Port 1 and Port 2 continuously.
17. Program Timer 1 to be counter. Use mode 2 and display the decimal count on P2, P1 continuously. Set the initial count to 99.
18. Draw the bit format of SCON register. Write the meaning of each bit.

19. Explain the different modes in serial interface of 8051.
20. What are the steps to be follow to program the 8051 to receive and transmit data serially.
21. Take data through ports 0, 1, and 2, one after other and transfer this data serially, continuously.
22. Write 8051 C program to transfer the message "YES" serially at 9600 baud, 8-bit data, 1 stop bit. Do this continuously.
23. How Port 0 structure in 8051 differs from Port 1, 2 and 3?
24. Write a program to make Port 2 toggle after o.5 second continuously.

UNIT 4

1. Draw and explain interfacing of 16*2 LCD to 8051. Write a program to display "HI" from second row-sixth column using busy flag.
2. Interface 4*4 keyboard to 8051. Explain it and write a program to read the value of key pressed.
3. Draw and explain interfacing of 16K x 8 Data RAM to 8051. Write a assembly program to read 100 bytes of data from P1 and save the data in external starting at RAM location 5000h.
4. Explain the MOVC A, @A+PC and MOVC A, @A+DPTR instruction with example.
5. Draw and explain interfacing of 8K x 8 Data ROM to 8051. Write a assembly program to read 30 bytes starting at 1000h in external ROM.
6. Draw and explain interfacing of 16K x 8 program ROM to 8051.
7. Draw and explain interfacing of ADC 0808/09 to 8051. Write a program to covert analog voltage on channel 1 to digital.
8. Draw and explain interfacing of a unipolar stepper motor to 8051 and write a program to rotate the stepper motor in clockwise direction continuously.
9. Write a program to rotate the stepper motor in anti clockwise direction continuously.
10. Write a program to rotate the stepper motor in clockwise direction for five rotations
11. Interface 8 LEDs to 8051 and write a program to turn on and off alternate LEDs continuously.
12. Interface one digit seven segment display to 8051 and write a program to display "0" to "9".
13. Interface two seven segment display to 8051 and write a program to display "00" to "99".
14. Draw and explain interfacing of DAC to 8051. Write a program
    i) To generate triangular wave
    ii) To generate a saw tooth wave

UNIT 5

1) List out the features of PIC16F877

2) How internal memory is organized in PIC 16F877?
3) What is the use of W, FSR, INDF, PCL, PCLATH registers in PIC?
4) How address of data is determined in different addressing modes in PIC 16F877?
5) How WDT and BOR internally operate?
6) Write PIC program to add two 16 bit numbers.
7) Write PIC program to clear memory location 20 h to 2F h with indirect addressing mode. Also write meaning of each used instructions.
8) What the following instruction does?
   1) BTFSS 2) DECFSZ 3) RETLW 4) IORWF
9) Draw and write the use of bits of STATUS register in PIC 16F877.
10) Draw PIC16F877 register file/internal memory map. What are the uses of partitioning into the banks and pages?
11) How do you use the PORT D as PSP? Explain the different control signals and flags used in PSP communication.

Unit 6

1) Describe functioning of CCP1 and CCP2 units for the capture mode.
2) Describe functioning of CCP1 and CCP2 units for the compare mode.
3) How do you operate CCP module in PWM mode? Explain PWM operation.
4) Draw and explain Timer0 module in PIC 16F877
5) How do you enable and disable the interrupts in PIC 16F877? Explain interrupt structure.
6) Write the steps to reading the EEPROM data memory in PIC and write a program for the same.
7) Explain I^2C operation in PIC microcontroller.
8) Explain Serial Peripheral Interface in PIC.
9) Write the steps to writing the EEPROM data memory in PIC and write a program for the same.
10) How do you configure the ADC in PIC 16F877? Explain its working.
11) Write a program to configure the internal ADC of PIC 16F877.
12) Explain Timer1 operation in PIC 16F877
13) What are the uses of Timer2 in PIC 16F877. Explain its operation.

P. A. H. Solapur University, Solapur
Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Unit 1 Introduction

1. Define embedded system. Explain major characteristics which differs embedded system from desktop computer.
2. List down the differences between RISC and CISC architecture.
3. Discuss the effect of pipeline on program execution in RISC architecture. A three stages instruction pipeline has the few stage delays. The delay of an inter-stage register stage of the pipeline is x nsec. What is the approximate speedup of the pipeline in the steady state under ideal conditions as compared to the corresponding non-pipelined implementation?
4. In RISC architecture an instruction requires four stages to execute: stage 1 (instruction fetch) = *a* ns, stage 2 (instruction decode) = *b* ns, stage 3 (instruction execute) = *d* ns and stage 4 (store results) = *c* ns. An instruction must proceed through the stages in sequence. What is the minimum asynchronous time for any single instruction to complete?
5. Sketch the general block diagram of embedded system hardware & software architecture and discuss it in detail.
6. Discuss the following design matrices which an embedded system designer should consider.
    a. Unit cost
    b. NRE cost
    c. Time-to-Market
    d. Time-to-Prototype
7. Explain the purpose & operation of assembler, linker and loader software tools.

P. A. H. Solapur University, Solapur
Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Unit 2 – ARM7 core fundamentals

1. Explain ARM programmer's model in detail (Operating modes, Register model, Program status registers, Data types etc.).
2. What is an exception? Explain vector addresses and vector table.
3. What is pipeline? Explain the effect of pipeline on program execution.
4. List all the exceptions and explain how they are handled in ARM in detail.
5. Explain LDR and STR instruction in detail with example.
6. Explain LDM and STM instruction in detail with example.
7. Explain the working of following instructions. (R7=0x00004000)
    1. LDMIA R7, {R0, R2-R4}
    2. LDMDB R7! , {R0, R2-R4}
    3. STMIA R7! , {R1-R3}
    4. STMDA R7! , {R1-R3}
8. Compare RISC and CISC architecture.
9. Evaluate the content of all registers and memory locations after the execution of following instructions independently. (R7=0x4000, R0=0x01, R1=0x02, R2=0x03, R3=0x04)
    a. LDMIA R7, {R0, R2-R3}
    b. STMDA R7! , {R1-R3}
10. Explain nomenclature used for ARM processors.
11. Explain different addressing modes of ARM7 in detail.
12. Draw and explain ARM core in detail.
13. Write an ARM ASM code to find length of null terminated string.
14. Write an ARM ASM code that copies one string over the top of another string.
15. Write an ARM ASM code to find total positive numbers from a series of 16 bit numbers.
16. What will be the content of register after the execution of given instruction?

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Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Unit 3 – Architecture of ARM7TDMI based Microcontroller

1. Discuss the all GPIO registers of LPC2148 with one example each.

2. Discuss the all pin connect block registers of LPC2148 with one example each.

3. Write a embedded C code to configure the LPC2148 port pin Pa.b as input port and if logic level is HIGH on this port pin then force logic LOW on port pin Pa.c without disturbing the functionality of other port pins.

4. Write a embedded C code to configure the LPC2148 port pin P0.a as output port without disturbing the functionality of other port pins.

5. A 10KΩ potentiometer is connected to ADC input channel ADx.y. Write a adc_init() embedded C code which configures LPC2148 port pin Pa.b for ADC without disturbing the functionality of other port pins.

6. Interface a 4x4 matrix keypad with LPC2148 and write a key_board_init() embedded C function to initialize port pins *Pa.b - Pa.e* as rows and *Pa.f - Pa.j* as columns.

7. Interface a 16x2 LCD module with LPC2148 and write a lcd_init() embedded C function to initialize port pins P0.x for RS, P0.y for EN, and *Pa.b* to *Pa.h* as data port.

***Text Book/Reference:**
LPC2148 data sheet, programming and debugging laboratory practices on LPC2148.

P. A. H. Solapur University, Solapur
Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Unit 4 – Microcontroller Interfacing and Programming

1. Explain procedure for determining PLL setting and list required conditions. Also configure CPU clock if external crystal is used as a clock source.
2. Interface LED's to LPC2148 port pins. Write an embedded C program to blink them alternately.
3. Draw and explain interfacing of LCD with LPC2148.
4. Draw and explain interfacing of keypad with LPC2148.
5. Design an embedded system with LPC2148 for the following specifications.
    a. Connect a 10KΩ potentiometer to ADC input channel.
    b. Connect a LED to port pin.

    Write an embedded C program to turn ON LED when voltage on ADC pin goes above 1V and turn OFF LED when voltage goes below 1V.
6. Interface a stepper motor with LPC2148 for the following specifications
    a. Motor is connected to port pins.
    b. Rotate motor in clockwise direction
7. Configure a 16x2 LCD module for LPC2148.
    a. Use P0.x for RS, P0.y for EN, and Pa.b to Pa.h as data port.
    b. Configure the LCD for 8/4 bit mode.
    c. Display string "Welcome" on LCD.
8. Design an embedded system with LPC2148, a temperature sensor and three LEDs (Red, Yellow, and Green).

    The system should
    a. Turn ON Green LED when temperature is below 30^0 C.
    b. Turn ON Yellow LED when temperature is between 30^0 C and 60^0 C.
    c. Turn ON Green LED when temperature is above 60^0 C.

    Draw a neat diagram and an embedded C program for
9. Design an embedded system with LPC2148 for the following specifications.
    a. Connect a potentiometer to ADC input channel.
    b. Connect a relay to port pin P0.y.

    Write an embedded C program to turn ON relay when voltage on ADC pin goes above 2V and turn OFF relay when voltage goes below 2V.

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Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Unit 5 – Real time operating system concepts

1. List down all the μcos-II RTOS features. Draw and explain the μcos-II Architecture in detail.
2. What is preemptive kernel? Elaborate in detail with example and proper diagram.
3. Discuss shared data problem and methods to solve it.
4. What is non-preemptive kernel? Elaborate in detail with example and proper diagram.
5. Discuss interrupt and interrupt timing for foreground/background, non-preemptive and preemptive kernel.
6. Explain clock tick in multitasking system. What are the constraints in selection of the clock tick in multitasking system? How accurate time this can give?
7. Define RTOS. Explain preemptive and non preemptive Kernel.
8. Define the context and context switching. What are the steps involved in μcos-II context switching? Why it puts additional burden on OS?
9. Define the context Switching. Explain with timing diagram the steps involved in µcos-II context switching?
10. Sketch and elaborate priority inversion with example and proper timing diagram.
11. Elaborate the problem of priority inversion and mechanism to prevent the same with example.
12. What is priority inversion? How to avoid it using priority inheritance?
13. Define priority inheritance also elaborate with example.
14. List down the types of priority-based kernels. Elaborate them with example.
15. How pre-emptive kernel is more responsive than non-preemptive kernel?
16. Why non-reentrant functions must not be used while using pre-emptive kernel?
17. Explain the various kernel objects for inter-process communication in μcos-II.
18. Explain the interrupt handling in μcos-II and draw the state diagram show interrupt related functions.
19. Explain the tasks involved in Embedded Systems application Cruise control.
20. What are the selection criteria of task scheduling techniques?

P. A. H. Solapur University, Solapur
Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Text Book/Reference:

1. **µC/OS-II: The Real-Time Kernel by Jean J. Labrosse – Refer chapter 02, 03**
2. **And lots of programming and debugging laboratory practices on LPC2148.**

***Note: The questions listed are model/sample questions and they may vary in format and content.**

P. A. H. Solapur University, Solapur
Third Year B. Tech. (Electronics) Sem-II
Embedded Systems
Question Bank

Unit 6 – RTOS programming

1. Define is a task? Sketch and elaborate different task states in detail.
2. Sketch and discuss state transition diagram for tasks in detail.
3. Explain operation and significance of the following μcos-II functions/APIs.
   i. OSStart(), OSInit(),OSIntEnter() and OSIntExit()
   ii. OSTaskCreate() & OSTaskDel()
   iii. OSMutexPost() & OSMutexPend () etc. and many more…….
4. What is a task? Elaborate the task control box (TCB) and its data in detail.
5. What is ready list in µcos-II? How µcos-II add the task in the ready list? How µcos-II remove a task from ready list?
6. What is an interrupts and elaborate the factors that contribute to interrupt response time in a system.
7. Write short note on
   i. Semaphore management in µcos-II
   ii. Mutual exclusion semaphore in µcos-II
   iii. Event flag management in µcos-II
8. State and explain the criteria for task scheduling and also elaborate various scheduling mechanisms.
9. Discuss the task scheduling.
10. Explain, Locking and unlocking of scheduler in µcos-II, nesting of scheduler lock, possible situation and precautions while using scheduler lock/unlock.
11. Elaborate with examples various inter-task/process communication tools like mailbox, message queue and semaphore used in RTOS environment.
12. Discuss various types of semaphore in detail.
13. How to use Mailox as binary semaphore. Explain by using pseudo code.
14. Enlist different MUTEX services. What configuration constants provided to configure MUTEX?
15. What are different events handled using ECB in uCOS-II. Explain data structure OS-EVENT.
16. Interface three LEDs with LPC2148. Draw a neat schematic diagram. Write a simple μcos-II program, which creates LED tasks to blink LEDs in different frequency.
17. Write an embedded C program to illustrate message queue in μcos-II for LPC2148.

18. Write an embedded C program to illustrate message mailboxes in μcos-II for LPC2148.
19. Write an embedded C program to illustrate semaphores in μcos-II for LPC2148.

Text Book/Reference:

3. **µC/OS-II: The Real-Time Kernel by Jean J. Labrosse – Refer chapter 02, 03**
4. **And lots of programming and debugging laboratory practices on LPC2148.**

***Note: The questions listed are model/sample questions and they may vary in format and content.**

FIRST YEAR B. TECH. (WEF 2020)
SUBJECT: ENGINEERING CHEMISTRY (C012)
QUESTION BANK

Q. No.	Questions	Marks
	UNIT-01: WATER CHEMISTRY	
1	Define BOD. Explain determination of BOD. Write its importance.	**3**
2	Define is COD. Explain determination of COD. Write is its significance.	**3**
3	Discuss disadvantages of hard water if used for boiler feed. Explain prevention method of the same.	**4**
4	Explain Ion exchange process for softening of hard water.	**4**
5	Explain sedimentation with coagulation of water.	**4**
6	Define desalination. Explain desalination of water by reverse osmosis process.	**4**
7	Define aeration Explain different types of aerators.	**4**
8	Define disinfection. Explain disinfection of water by chlorine.	**4**
9	A sample of water on analysis was found to contain the following impurities in mg/lit: **Amount** **Mo. Wt.** $Ca(HCO_3)_2$ 40.15 162 $Mg(HCO_3)_2$ 38.73 146 $MgSO_4$ 14.10 120 $CaCl_2$ 3.90 111 CaSO4 7.00 136 MgCl2 6.5 95 Calculate the temporary, permanent and total hardness of water in mg/lit.	**4**
10	Chlorine is used as a good disinfectant. Justify the statement by giving reaction only.	**3**
11	Explain disinfection of water by Chloramine, bleaching powder.	**3**
12	Explain disinfection of water by ozonolysis.	**3**
	UNIT-02: ENERGY STORAGE SYSTEM	
1	Explain characteristics of batteries.	**3**
2	Explain principle of Li-ion batteries.	**3**
3	Explain principle and components of fuel cells.	**3**
4	Describe AFC cell with applications.	**3**
5	Explain hydrogen production.	**3**
6	Define cell and battery. Explain classification of batteries.	**3**
7	Explain lithium-ion battery with the chemical reactions involved in charging and discharging and applications.	**3**
9	Explain PEFMC cells with their applications.	**3**
10	Explain different types of hydrogen storage systems.	**3**
11	Explain methanol based fuel cell with its applications.	
	UNIT-03: LUBRICANTS	
1	Define Lubricant. Explain its functions.	**3**
2	Define lubrication. Explain mechanism of thick film lubrication.	**3**
3	Explain mechanism of boundary lubrication and extreme pressure lubrication.	**4**
4	Explain types of liquid lubricants.	**4**

5	Explain semisolid lubricants.	**3**
6	Explain solid lubricants with examples.	**3**
7	Select proper lubricants for i) Delicate instruments ii) Refrigeration systems iii) Gears	**3**
8	Select proper lubricants for i) Cutting tools ii) Transformers iii) I. C. Engine	**3**
9	Define following terms i) Viscosity ii) Viscosity index iii) Flash point iv) Fire point	**4**
10	Define following terms i) Cloud point ii) Pour point iii) Aniline point	**3**
11	Define following terms i) Oiliness ii) Acid value iii) Saponification value.	**3**
12	In acid value determination of a lubricating oil 7 gm of oil sample required 3.1 ml of N/10 KOH solution calculate its acid value.	**3**
13	8 gm of an oil sample after saponification with 70 ml of N/2 alcoholic KOH solution and subsequent titration with N/2 HCl gave the titre value of 10 ml to phenopthalein end point .A blank experiment was conducted without taking oil sample. On repeating same procedure gave a titer value of 70 ml. Calculate saponification value of an oil sample.	**3**
UNIT-04: CORROSION		
1	Define corrosion. List the types of corrosion? Explain mechanism of oxidation corrosion.	**4**
2	Explain Hydrogen evolution mechanism and oxygen absorption mechanism in electrochemical corrosion.	**4**
3	Explain factors affecting on rate of corrosion.	**3**
4	Explain testing and measurement of corrosion by weight loss method and electrical resistance method.	**3**
5	Describe cathodic protection in corrosion control.	**4**
6	Explain anodic protection for corrosion control.	**3**
7	Explain prevention of corrosion by galvanizing and tinning.	**4**
8	Describe metal cladding for corrosion control	**3**
9	Explain difference between galvanizing and tinning.	**3**
10	Explain effect of nature of oxide film in oxidation corrosion.	**3**
UNIT-05: METALS, ALLOYS & CERAMICS		
1	Define alloy. Explain purpose of alloying.	**4**
2	Explain composition, properties and applications of cast iron, steel and wrought iron.	**3**
3	Compare cast iron, steel and wrought iron for its composition and properties.	**3**
4	Define ceramics. Explain general properties of ceramics.	**3**

5	Explain different steps of manufacturing of glass.	**4**
6	Explain different types of glass.	**3**
7	Explain classification of ceramics.	**3**
8	Summarize general properties of glass.	
	UNIT-06: FUELS	
1	Define the terms i) Calorific value ii) Gross calorific value iii) Net calorific value	**3**
2	Explain the characteristics of good fuels.	**3**
3	Define Fuel. Explain classification of fuels.	**3**
4	Compare solid, liquid and gaseous fuels.	**3**
5	Explain construction and working of bomb calorimeter.	**4**
6	Explain construction and working of Boy's calorimeter.	**4**
7	Define petroleum. State is its composition. List its types.	**4**
8	Explain refining of petroleum with diagram.	**4**
9	Define biodiesel. Explain preparation of biodiesel by transesterification process.	**3**
10	Summarize advantages and disadvantages of biodiesel.	**3**
11	A sample of coal containing 5% H, when tested in the laboratory for its calorific value in the bomb calorimeter, the following data were obtained: Weight of coal burnt = 0.95 g Weight of water taken = 700 g Water equivalent of bomb and calorimeter = 2000 g Rise in temperature = 2.48^0C Cooling correction = 0.02^0C Fuse wire correction = 10 cal. Acid correction = 60 cal Calculate the gross and net calorific value of the coal in cal/g. (Take latent heat of condensation of steam = 580 cal/g)	**4**
12	Calculate gross and net calorific value of a coal sample of coal having C = 80%, H = 7%, O = 3%, S = 3.5%, N = 2.1% and ash = 4.4%. (Take latent heat of steam = 580 cal/g)	**4**
13	During the determination of calorific value of a gaseous fuel by Boy's calorimeter, the following results were obtained: Volume of the gaseous fuel burnt at STP = 0.12 m^3 Weight of water used for cooling = 35.2 Kg Weight of steam condensed = 0.051 Kg Temperature of Inlet water = 25.1^0C Temperature of Outlet water = 39.5^0C Determine the gross and net calorific values of gaseous fuel. (Take latent heat of condensation of steam = 587 kcal/kg)	**4**
14	List various fractions of petroleum after refining with boiling range and number of carbon atoms.	**3**
	UNIT-07: POLYMERS	
1	Define polymerization. Explain addition and condensation polymerization.	**3**
2	Define plastics. Explain thermosoftening and thermosetting plastics.	**3**
3	Explain molding of plastics in to articles with labelled diagram by following methods. i) Transfer molding ii) Extrusion molding	**4**

4	Explain isolation and processing of natural rubber.	**3**
5	Describe drawbacks of natural rubber? Explain vulcanization of natural rubber with chemical reactions. List advantages of vulcanized rubber?	**4**
6	Explain properties and applications of PVC and PET.	**3**
7	Explain properties and applications of BUNA-S rubber and Thiokol rubber.	**3**
8	A polymer has following population 5 molecules have molecular weight each 5000 10 molecules have molecular weight each 7500 15 molecules have molecular weight each 9000 20 molecules have molecular weight each 12000 Calculate its number average molecular weight.	**3**
9	Calculate Molecular weight of polyvinyl chloride having degree of polymerization 400.	**3**
10	Describe biodegradable polymer. Discuss its examples with applications	**3**
11	Calculate Degree of polymerization of PVC having molecular weight 25000.	**3**
12	Explain molding of plastics in to articles with labelled diagram by following methods. i) Compression molding ii) Injection molding	
	UNIT-08: MODERN ANALYTICAL TECHNIQUES	
1	Define Chromatography. Explain its classification.	**3**
2	Explain how components of mixture are separated by GLC.	**4**
3	Define TGA. Explain instrumentation of TGA. What are its applications.	**4**
4	Explain applications of GLC and TGA.	**3**
5	Define Normality, Molarity, Molality, Mole fraction.	**4**
6	Calculate weight of Na_2CO_3 required to prepare 0.2 N 500 ml solution.	**3**
7	Calculate weight of $AgNO_3$ required to prepare 0.01 M 700 ml solution.	**3**
8	Draw labelled block diagram of GLC.	**3**

Class: T.Y. B. Tech **Sub: Industrial And Quality Management**

Unit wise Question Bank

Section I

Unit 1 - Introduction to Management and Industrial Functions

1. Describe nature & importance of authority and responsibility in any manufacturing industry.
2. Compare centralization & decentralization with suitable examples.
3. What are the aspects of social responsibility and ethics for an organization. Elaborate it with real life example.
4. Define Management and elaborate major management functions with examples.
5. Comment on and justify the statement - "Management is an art of getting things done through people".
6. Discuss in detail the systems approach to Production & Operations Management.
7. How will you define Marketing Management? Compare sales & marketing management.
8. Describe various domains of social responsibility for an industry.
9. What is financial management? Discuss its major issues highlighting capital Market and investment.
10. Compare administration and organisation.

Unit 2 – Planning, Organizing and Staffing

1. Define planning and hence discuss various steps in planning with example.
2. What is organization structure for a manufacturing industry? Discuss duties and responsibilities of each head in it.
3. What is authority? Elaborate the meaning of delegation of authority with effective guidelines to overcome weak delegation.
4. What are different types of Plans? Explain in brief the steps involved in planning process.
5. Explain in detail the selection process for recruiting trainee engineers in an organization.
6. What is span of control? Discuss with suitable examples.
7. Explain the need and elements of the performance appraisal.
8. Explain decision making process with types of decision.
9. Explain the elements for performance appraisal. What are the various methods of training the managers?
10. Define Human Resource Management and hence discuss different sources of recruitment.

Unit 3 – Leading and Controlling

1. Elaborate Maslow's theory of hierarchical needs.
2. Discuss types of communication with suitable example.
3. Explain leadership behaviour and styles.
4. Explain Maslow's theory and McGregor's theory.
5. Define communication. List its types. Differentiate between oral communication and written communication.

6. What is communication? Explain process of Communication.
7. What is motivation? Explain Maslow's theory of motivation.
8. What is motivation? Explain Carrot & Stick theory of motivation.
9. Explain human factors considered in Managing.
10. What is controlling? Explain different steps in Controlling.

Section II

Unit 4 - Introduction to Quality

1. Explain the following as applied to quality control
    Appraisal cost
    Prevention cost
    Failure cost
2. Elaborate the concept of supplier partnership.
3. Name any three quality gurus and their contribution in quality management.
4. Discuss various types of quality costs.
5. Explain the basic concepts of Total Quality Management.
6. Describe the various dimensions of quality of a product and explain how the customer expectations are related to quality of product.
7. What is the meaning of quality of design and quality of conformance? Explain the factors affecting quality of design.
8. Define the term quality and explain various factors affecting the product quality.
9. Write a note on continuous process improvement cycle and Juran's Trilogy.
10. Explain various types of sampling plans which are in practice in industry with their respective acceptance criteria.

Unit 5 - Total Quality Management

1. Explain cause and effect diagram, scatter diagram and pareto analysis
2. List the various quality tools and explain with example Pareto Analysis.
3. In a foundry shop, it is reported that 20% of the produced products are defective. The Quality Manager has identified following causes for defective production:
a) Material — Non homogenous lots, uncontrolled composition from various sources etc.
b) Process – Temperature variation, delay in filling molds, uncontrolled cooling, cleaning not proper
c) Machines — not maintained, old
d) Labor — Unskilled, lack of training, unaware
e) Tools – No maintenance, workout.
Draw the cause effect diagram.
4. Compare Pareto Diagram and Histogram and draw the suitable diagram with following data:

Frequency	5	30	40	7	3	4	5	6
Category	A	B	C	D	E	F	G	H

5. Write note on continuous improvement process
6. How employee involvement affects organization performance? What are various ways to improve employee involvement?
7. What is cause- effect diagram? Discuss in detail with suitable example.
8. What are seven quality tools and explain in detail any one?

9. What are control charts in QC? Explain their importance.
10. Name any three quality gurus. Explain their contribution in the field of quality.

Unit 6 - Statistical Process Control

1. A manufacturer purchases small bolts in cartons that usually contain several thousand bolts. Each shipment consists of a number of cartons. As a part of acceptance procedure for these bolts 400 bolts are selected at random from each carton and are subjected to visual inspection for certain defects. In shipment 10 cartons the respective percentage of defectives in the sample from each carton are 0, 0, 0.5, 0.75, 0, 2.0, 0.25, 0, 0.25 and 1.25. Does this shipment of bolts appear to exhibit statistical control with respect to the quality characteristics examined in the inspection?
2. Write a note on $\overline{X}$-R chart
3. What is acceptance sampling? Explain sampling plans and types of sampling plans.
4. Explain the OC curve in detail.
5. What is sample and what is population? Compare sample and population.
6. What are advantages and limitations of sampling plan? Explain various types of sampling plans which are in practice.
7. Write procedure for control chart preparation. Explain it for 'C' chart.
8. Differentiate between single sampling plan & double sampling plan. Discuss the interest of the consumer & the producer in the selection of sampling plans.
9. Explain actual and ideal OC curve for a sampling plan. Also explain all concepts such as producer's risk, consumer's risk. AQL, LTPD, AOQL etc.
10. A double sampling plan is as follows:
a) Select a sample of 2 from a lot of 20. If both articles inspected are good, accept the lot. If both are defective, reject the lot. If 1 is good and 1 defective, take a second sample of one article.
b) If the article in second sample is good, accept the lot. If it is defective, reject the lot. If a lot 25% defective is submitted, what is the probability of acceptance? Compute this by the method that is theoretically correct rather than an approximate method.

TY (Electronics & Telecommunication Engg.) (Part –II) Examination
Open Elective II- Optical Communication
QUESTION BANK

Q1) Solve any four of the following (4*4=16 M)

a) Explain the advantages & disadvantages of Optical Communication.

b) Write the different types of fiber & explain any one.

c) Compare the block diagram of optical communication system with general communication system.

d) Explain attenuation & reasons for attenuation.

e) Explain fiber alignment & joint loss.

f) Optical fiber has numerical aperture of 0.30 & cladding refractive index of 1.49.Determine

   i) The acceptance angle for the Fiber in air

   ii) Critical Angle

g) Explain the absorption losses in Optical Fiber.

h) What are requirements of optical source?

i) Explain the basic working principle of optical source.

j) Compare dispersion in various types of fiber.

k) An optical fiber has core RI 1.48 & cladding RI 1.46.
Estimate NA & critical angle.

l) Derive the expression for NA.

m) Explain the absorption losses in Optical Fiber.

n) A long single-mode Optical Fiber has an attenuation of 0.4 $dBkm^{-1}$ when operating at a wavelength of 1.8 µm. The Fiber core diameter is 8µm and the LASER source bandwidth is 500 MHz . Calculate the threshold Optical powers for stimulated Brillouin and Raman scattering within the Fiber at the wavelength specified.

o) Define relative refractive index difference for an Optical Fiber and show how it may be related to the numerical aperture.

p) Explain the concept of intrinsic absorption.

q) What are the advantages and disadvantages of the LED?

r) Compare LED & LASER.

Q 2) Solve any two of the following **(2*6=12 M)**

a) Explain the conditions for total internal reflection of light.

b) Compare Step index & graded index fiber.

c) Explain the different types of fiber.

d) A 15 Km Optical Fiber link uses Fiber with a loss of 1.5 db/Km. The Fiber is joined every kilometer with connectors which give an attenuation of 0.8 dB each. Determine the minimum mean Optical power which must be launched into the Fiber in order to maintain a mean Optical power level of 0.3 μW at the detector.

e) Explain Scattering losses in optical fiber.

f) What is difference in splices & connectors ? Explain any one type of splice.

g) Draw & explain function of surface emitting LED.

h) Explain the structure of the semiconductor injection LASER.

i) Explain LED characteristics.

j) Explain heterojunction structure.

k) Explain the fusion splicing.

l) Explain the working principle of LASER.

m) Write the applications of optical Communication.

n) A step index Fiber in air has a numerical aperture of 0.16, a core refractive index of 1.45 and a core diameter of 60 μm. Determine the normalized frequency for the Fiber when light at a wavelength of 0.9 μm is transmitted. Further, estimate the number of guided modes propagating in the Fiber.

Section-II

Q3) Solve any four of the following **(4*4=16 M)**

a) Derive the expression for responsivity of optical detector.

b) Explain the benefits and the drawbacks of the avalanche photodiode.

c) Explain the working principle of PIN photodiode.

d) GA As has a bandgap energy of 1.43 eV at 300 K. Determine the wavelength above which an intrinsic photodetector fabricated from this material will cease to operate.

e) Explain optical receiver design.

f) Explain link power budget approach.

g) Which optical interfaces are used in SONET?

h) Define data bus & explain its different structures.

i) Explain the conditions for absorption of photon by optical detector.

j) Define cut off wavelength of optical detector & derive its formula.

k) Explain the difference in WDM & DWDM.

l) Define the terms in optical detector a) Quantum efficiency b) Absorption coefficient.

m) Explain why the photodiode is connected in reverse biased?

n) Define optical network & explain its subparts.

o) Explain the different topologies used in optical network.

p) Explain the conditions for absorption & emission of light.

Q 4) Solve any two of the following **(2*6=12 M)**

a) A PN photodiode has a quantum efficiency of 60 % at a 0.9 µm. Calculate : i) Its responsivity at 0.9 µm.

ii) Received Optical power if mean photocurrent is 10^{-6} A

iii) Corresponding number of received photon at this wavelength

b) A Phototransistor has a collector current of 15 mA when the incident Optical power at a wavelength of 1.26 µm is 125 µW. Estimate the Optical gain of the device under the above conditions.

c) A photodiode has a quantum efficiency of 75% when photons of energy 2.5×10^{-19} J are incident upon it, calculate

(a) At what wavelength is the photodiode operating?

(b) Calculate the incident Optical power required to obtain a photocurrent of 3.5 μA when the photodiode is operating as described above.

d) Explain the ring topologies used in SONET.

e) Explain optical link design.

f) Elaborate the concept of WDM.

g) Explain the concept of the Optical time domain multiplexing.

h) Draw the noise equivalent circuit for the Optical receiver and explain the parameters responsible for the noise.

i) Compare the PN,PIN & Avalanche photodiode.

j) Explain the concept of optical Ethernet.

k) What is difference in electrical TDM & Optical TDM?

l) Summarize the parameters considered in optical transmitter & receiver design.

m) Draw & explain the structure of SONET/SDH.

T. Y. B.Tech (E& TC) Sem - I
(w.e.f. June 2020)Examination
Microcontrollers & Applications
Question Bank

Section I

1. Explain the various addressing modes with one example in each.
2. Write an ALP to generate triangular waveform using DAC.
3. Compare Timer and Counter on the basis of Mode of operation.
4. Write an ALP for finding maximum value in an array.
5. Mention the SFR registers used in timer operation?
6. What are registers used for serial communication in 8051?
7. Write a assembly program to multiply two 16-bit numbers for 8051 controller.
8. List the interrupts available in the 8051 microcontroller. Explain interrupt enable (IE) SFR and Interrupt priority (IP) SFR.
9. Explain operation of timer in mode 1. Discuss programming steps to generate time delay using mode 1. Write program to generate delay of 1 second using timer 0 in mode 1.
10. Draw and explain interfacing of 4x4 matrix keyboard with 8051 microcontroller. Write program to read switch.
11. Explain interfacing of stepper motor with microcontroller.
12. Draw and explain interfacing diagram of ADC with 8051 microcontroller.
13. Write an assembly language program to convert two ASCII value to packed BCD number for 8051 microcontroller.
14. Draw and explain time/counter logic diagram for 8051 microcontroller. Write a program to generate square wave of frequency 1KHz on pin 1.2
15. Write a program to generate frequency of 100Kz on pin 2.3. Use timer 1 in mode 1.
16. Draw and explain Interfacing of 1K bytes of external RAM and 8K bytes of ROM with 8051 microcontroller.
17. Write a program to send the text string “hello” to serial port 1. Set the baud rate at 9600,8 bit data, and 1 stop bit.
18. Write a program to rotate stepper motor using 8085 microcontroller

19. Draw the format of PSW register of 8051 and state the functions of each bit.
20. Differentiate microprocessor and micro controller.
21. Describe following branching instructions:
    1) DJNZ R0,UP
    2) CJNE @R1, #80H, LOOP
    3) JB P1.5,Here
22. State addressing modes of 8051. Describe any two addressing modes with example.
23. Describe stack operations in 8051 microcontroller with suitable examples.
24. State and explain the interrupts used in 8051 microcontroller.
25. Write a program for 8051 microcontroller to generate a square wave of 2 KHz frequency on Pin P 1.5. Assume crystal freq. = 11.0592 MHz.
26. Write a program to find the largest number in an array of 10 numbers stored in internal RAM.
27. Describe timer operations of 8051 microcontroller in mode 1 and mode 2 with respect to application and advantages.
28. Draw diagram of port 0 of 8051 and label it. Write the process to read port 0 pin status.
29. Draw format of IE register and describe each bit.
30. Write a program to rotate a stepper motor continuously in clockwise direction.
31. Draw neat labeled interfacing diagram of LCD with 8051 microcontroller and write a program to display “SOLAPUR”.
32. Write program to receive bytes of data serially and put them in port P1. Set baud rate of 4800, 8 bit data and 1 stop bit. Assume crystal freq. = 11.0592 MHz.
33. Draw interfacing diagram of 7 segment display with Port 1 of 8051 micro controller. Write a program to display BCD numbers from 0 to 9.
34. What is the function of the bits PSW.3 & PSW.4?
35. Find the value of the PSW register after the execution of the instructions.

```
MOV A, #95
ADD A, #120
```

36. What is the use of SFR in 8051?
37. List all the SFRs involved in 8051.
38. What are the addressing modes supported by 8051?
39. Write one instruction each using the following addressing modes.
    a. Immediate b. Register c. Register indirect d. Direct
40. List out the instructions set available in 8051.

Section II

1. Elaborate the objectives, structure, assembler directives of PIC-Assembly language programming.
2. Explain about the Architecture of PIC 16C7X with necessary diagrams.
3. Give detailed note on state machines and key switches in PIC microcontroller.
4. Describe about PIC interfacing with peripherals that includes ADC with neat sketches.
5. Describe about PIC interfacing with peripherals that includes DAC with neat sketches.
6. Describe about PIC interfacing with peripherals that includes keyboard with neat sketches.
7. Write a C program to display any message on LCD display for PIC.
8. Write a program to rotate stepper motor using PIC microcontroller
9. Write a C program to convert analog voltage into digital using ADC for PIC.
10. Write a C program to display any message on LCD display for PIC.
11. What are the groups of instruction set in PIC micro controller?
12. Using the instruction of PIC micro controller convert BCD to hex.
13. Name the addressing modes of PIC micro controller.
14. What type of architecture is there in PIC micro controller?
15. List the functions of I/O port in PIC micro controller.
16. What are modes of operation of timers in PIC micro controller?
17. What is the role of watch dog timer in PIC micro controller.
18. Write an assembly language program for BCD to ASCII conversion using PIC instruction set.
19. How do you make a port as I/P & O/P port in PIC micro controller?
20. Write one example for immediate & direct addressing mode in PIC micro controller.

21. Write a C program to toggle all the bits of Port A continuously.
22. Write an assembly language program for BCD to binary conversion using PIC.
23. Write a C program to set bit RB0 and send it to RC7 after inverting it
24. Discuss in detail about I2C bus and serial EEPROM.
25. With a neat diagram discuss in detail about the architecture of PIC micro controller.
26. Discuss in detail about the function of various port pin of PIC micro controller
27. Explain the different addressing modes of PIC micro controller.
28. Discuss in detail about the memory organization of PIC micro controller.
29. Write a program to read the data, convert to ASCII and displays it in a micro controller.
30. Write a program in PIC micro controller to multiplying 'N' byte numbers.
31. Write an assembly language program to add two numbers stored in location 07H & 08H.
32. Using PIC micro controller how is analog signal is converted into digital signal?
33. What are interrupts available in PIC micro controller
34. Which port will support for external interrupt in PIC.
35. Draw the bit pattern for configuring the USART.
36. What is the main function I2 C interface?
37. What are the main difference flash memory & EEPROM?
38. Mention the special functions of PORTA.
39. List the features of USART.
40. List out the features of CCP module
41. List the pins/signals used for ADC interfacing.
42. List the pins/signals used for Sensor interfacing
43. Explain in detail about the compare and capture mode of the PIC micro controller with a neat diagram.
44. Write a short notes on ADC interfacing in PIC micro controller.
45. Briefly explain the I2 C interfacing using PIC micro controller. Give the special function register involved & the corresponding wave form.
46. Draw and explain compare, capture and PWM module 1 & 2 of PIC micro controller with their associative register.
47. Write short notes on CCP modules.
48. Briefly explain the sensor interfacing using PIC micro controller.

49. Determine the pulse width of positive going pulse to RC2/CCP1 pin of P1 micro controller. Assume that OSC=4MHz and that the pulse width is less than 65,535μs and longer than 300μs. Write an assembly language program for the given specification using PIC instruction set.
50. Draw and explain the architecture of on chip ADC of PIC micro controller in detail and write a suitable assembly language program for configuring the ADC.

T.Y. (Electronics Engg) (Sem – II) (CBCS)

Automotive Electronics

Self-Learning Module

Question Bank-

Unit-1 - Power Train Engineering and Fundamentals of Automotive

Sr. No	Question
1	Explain different electrical and electronic components used in automobiles
2	What Is I.C Engine?
3	What are The Advantages Of Lubrication In IC Engine?
4	What are the Advantages and Disadvantages of Using LPG In Car?
5	Why Diesel Engine Don't Have Spark Plug?
6	What are the important operational performance parameters in design of fuel firing equipment?
7	What are the applications of IC engine?
8	what are the measures of IC engine performance?
9	Classify IC engines
10	Explain MPFI system
11	Explain types of air motion in I.C. Engine.

Unit-2- Sensor Technologies in Automotive

Sr. No	**Question**
1	What is working principle, characteristics, limitations of coolant temp sensor.
2	What is working principle, characteristics, limitations of manifold, exhaust differential and types
3	What is working principle, characteristics, limitations of anti-collision sensors
4	What is working principle, characteristics, limitations of antiskid and motion sensors
5	What is working principle, characteristics, limitations of vibration sensors used in airbags
6	When the car temperature sensor goes bad
7	Explain different types of MAP sensor

Unit-3 - Interfacing Principles of Sensors

Sr. No	**Question**
1	Explain instrumentation amplifier and comparator.
2	Explain Multiplexing and Demultiplexing with an application in automobile
3	What do you mean by active and passive sensors?
4	Discuss level shifters and wave shaping circuits related to automotive
5	Discuss noise reduction mechanism used in automobiles

6	Discuss different types of ADCs.
7	Explain R/2R ladder DAC.
8	Describe sigma-delta ADC in detail.

Unit-4 - Actuators in Automotive Systems

Sr. No	Question
1	What is working principle of pneumatic sensor:
2	Explain different types of pneumatic sensors
3	Classify pneumatic sensor based on application for which air cylinders are used
4	What are different electric actuating systems
5	What re different types of DC electric motors? Discuss characteristics of both
6	What are different methods of speed control in DC motor?
7	Explain working of solenoid valve.
8	What are different types solenoid valves?
9	Explain in brief hydraulic actuators.

Unit- 5 - Electronic Control Unit and Automotive Control System

Sr. No	Question
1	Explain EGO system
2	Draw block diagram of fuel control system and describe it
3	Describe electronic ignition system
4	Explain trip information system
5	Describe vehicle speed measurement system
6	Explain traction control system in detail
7	Describe vehicle braking system neatly

Unit- 6- Automotive Communication and Diagnostic Systems

Sr. No	Question
1	Draw and explain block diagram for electronic control system for diagnosis
2	Describe on-board diagnostic system
3	Explain occupant protection system or air bag system
4	What is collision avoidance radar system? Explain it in detail
5	Explain sensor multiplexing system in detail
6	Describe automatic driving control system
7	Explain CAN bus and its principle of operation in detail
8	Explain CAN bus physical layer

T.Y. B. Tech (Electronics Engineering) (Sem – II) (CBCS)

COMPUTER NETWORKS

Question Bank-

Unit-1 -

Sr. No	Question
1	Explain in detail EIA 232 standard for Serial Communication.
2	Explain with help of example baud rate and bit rate
3	A signal Carries 5 bits in each signal element. If 1200 signal elements are sent per second, find the baud rate and bit rate.
4	Calculate the number of bits per symbol and also the number of symbols in signal having bit rate of 115200 bits per sec and baud rate 9600 sym/sec. Also comment on to increase the bit rate to double the existing data rate.
5	State the advantages of layered reference model for data communication.
6	Draw and explain ISO-OSI reference model and discuss various issues handled in these layers.
7	Write formulae to find channel capacity. Find bit and baud rate for a signal which uses two bits in each signal element and sent at the rate of 1500 elements/ second over the channel.
8	List different cables used in computer communication
9	Give the difference between circuit switching and packet switching techniques.
10	Using diagram explain different network hardware and software used.

Unit-2

Sr. No	**Question**
1	State and explain Difference between a Packet and a Frame. Explain different methods of frame making
2	Find CRC and transmitted bit string for a message 1101011011. Assume generator bit string 1011 for transmitter
3	Why Flow control is essential? Discuss Stop and wait flow control protocol in detail.
4	Calculate Hamming code-word for a data '1011'. Assume even parity during transmission (7,4)
5	Calculate Hamming code-word for an ascii character ‘K’ – 1001011. Assume even parity during transmission (11,7)
6	What is the difference between error correction and error detection mechanisms ? Describe CRC algorithm to find checksum and transmitted bit string
7	What is Hamming Distance? Find hamming codeword for a character F = 1000110. Assume even parity. What is the limitation of Hamming code method.
8	Discuss Go back N ARQ and Selective repeat ARQ related to sliding window flow control method
9	Explain CSMA method in detail. Discuss about perfromance of different methods

10	What is CRC method for error detection? Find CRC code for data word 1101011011 and divisor 10011
11	What are various frame making methods?
12	Discuss the stop and wait protocol in detail?
13	Discuss the working principle of sliding window protocol mechanism in detail?
14	What is CRC method for error detection ? Find CRC code for data word 110101010 and divisor 1010
15	Explain Stop_and_Wait flow control mechanism in short and derive expression for its link utilization efficiency
16	What is sliding window flow control mechanism ?
17	If a frame size is 960 bytes on a channel operating at 960 kbps, what is the maximum link utilization efficiency, if window size is 7 and 127 in case of sliding window flow control mechanism
18	List various CSMA methods
19	List the different modes of data transfer in HDLC
20	Draw and explain different HDLC frame formats. List limitations of normal modes of operation in case of HDLC
21	What is medium access control ? Explain different CSMA mechanism in brief.
22	Illustrate with a neat diagram working of CSMA/CD in detail?

Unit-3

Sr. No	Question
1	What is minimum frame size limitation in Ethernet LAN ? Draw frame format for IEEE 802.3 Ethernet standard and explain in detail.
2	Describe IEEE 802.3 MAC sublayer in detail.
3	List various CSMA methods. What is minimum frame size limitation in Ethernet LAN ? Draw frame format for IEEE 802.3 Ethernet Standard and explain in detail
4	Draw frame format of IEEE 802.3 LAN and explain each field in detail. Is efficiency of IEEE 802.3 LAN is function of Frame Size?
5	what is token ? Draw frame format for IEEE 802.4 LAN standard and explain in detail
6	what is token ? Draw frame format for IEEE 802.5 LAN standard and explain in detail
7	Give the comparison between different LAN Protocols?
8	Draw and Explain different LAN Topologies?
9	Explain in detail IEEE 802.15 Bluetooth Protocol
10	With the help of neat diagram explain protocol stack in bluetooth protocol

Unit-4

Sr. No	Question
1	What are different types of network devices ? Discuss each in brief
2	Explain Different types of Modems
3	List various network devices used in networking
4	Discuss the terms, Modems, switches, hubs, bridges?

5	Differentiate between Switches and Hubs
6	Differentiate between Routers and Switches
7	Compare Router , Switches, Gateways
8	What is Router ? Explain in detail
9	What is Switch? Explain in Detail
10	what is Hub ? Explain in Detail

Unit- 5

Sr. No	Question
1	Illustrate with a neat diagram working of TCP/IP in detail
2	Discuss the term Internet protocol ver. 4 (IPv4) in detail with its different types of notations
3	Give the difference between TCP/IP and UDP/IP
4	With a neat diagram discuss UDP header
5	Explain three way handshakes in TCP. What is the use of VER, HELN and TTL fields in case of IP?
6	Discuss TCP/IP header format, also describe how each field is used during communication?
7	What is host and net id in case of IP address? What is mask and subnetting related to IP? What are the classes of given IP address? i) 4. 23. 145. 90 ii) 156.64.37.210
8	What encapsulation and decapsulation in TCP/IP ? Discuss three way handshake in TCP
9	What is the difference between host to host and process to process communication?
10	Draw IP Header format and explain neatly
11	Draw UDP packet format and explain its header. Compare between TCP and UDP
12	Draw TCP/IP reference model and describe each layers function in detail.
13	what is encapsulation and de-capsulation in TCP/IP?
14	What are class full IP addresses and dotted decimal notation? Give address ranges of various IP class addresses.
15	Draw the TCP header format and explain each field in detail. List various features of TCP.
16	why IP is called best effort networks? What are different types of ICMP messages and their meaning?
17	What are different IP address classes ? Write ranges of different IP addresses. What is masking in case of IP ? What is network mask for IP address of 192.168.23.14 ?
18	Draw TCP/IP reference model and describe it in detail. What is congestion in TCP ?
19	What are physical, logical and port address related to TCP/IP ? Draw UDP datagram format and explain.
20	What is the meaning of default mask ? Find net-id and host-id for ‘137.7.21.64’ and ‘221.46.75.64’

21	What is dotted decimal notation in IPv4 ? Draw and describe special IPv4 Address formats.

Unit- 6

Sr. No	Question
1	Give comparison between virtual circuit & datagram approach.
2	Discuss the routing protocol with reference to shortest path algorithm.
3	What is principle of optimality and fairness in routing ? Discuss Flow based routing algorithm in detail.
4	What is principle of optimality and fairness in routing ? Discuss shortest path algorithm in detail.
5	Compare between virtual circuit and datagram approach.
6	Explain flow based routing protocol in detail.
7	Explain in detail shortest Path Protocol in Computer Networks
8	Explain in detail Distance Vector Routing Protocol in Computer Networks
9	Explain in detail Link state Routing Protocol in Computer Network
10	Explain BGP in detail
11	Explain OSPF in Detail
12	Compare BGP and OSPF

Unit- 7

Sr. No	Question
1	Explain in brief client server Architecture
2	Explain in detail use of Socket in Computer Networks
3	With Example explain client server Communication
4	Explain client server model briefly and discuss the characteristics of Client server model
5	List different types of servers that can be deployed
6	List different components in client server architecture
7	What are different architecture types in client-server model
8	Compare Peer to peer vs Client -Server Model

T.Y. B. Tech (Electronics Engineering) (Sem – II) (CBCS)

COMPUTER NETWORKS

Question Bank-

Unit-1 -

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8	Discuss Go back N ARQ and Selective repeat ARQ related to sliding window flow control method
9	Explain CSMA method in detail. Discuss about perfromance of different methods

10	What is CRC method for error detection? Find CRC code for data word 1101011011 and divisor 10011
11	What are various frame making methods?
12	Discuss the stop and wait protocol in detail?
13	Discuss the working principle of sliding window protocol mechanism in detail?
14	What is CRC method for error detection ? Find CRC code for data word 110101010 and divisor 1010
15	Explain Stop_and_Wait flow control mechanism in short and derive expression for its link utilization efficiency
16	What is sliding window flow control mechanism ?
17	If a frame size is 960 bytes on a channel operating at 960 kbps, what is the maximum link utilization efficiency, if window size is 7 and 127 in case of sliding window flow control mechanism
18	List various CSMA methods
19	List the different modes of data transfer in HDLC
20	Draw and explain different HDLC frame formats. List limitations of normal modes of operation in case of HDLC
21	What is medium access control ? Explain different CSMA mechanism in brief.
22	Illustrate with a neat diagram working of CSMA/CD in detail?

Unit-3

Sr. No	Question
1	What is minimum frame size limitation in Ethernet LAN ? Draw frame format for IEEE 802.3 Ethernet standard and explain in detail.
2	Describe IEEE 802.3 MAC sublayer in detail.
3	List various CSMA methods. What is minimum frame size limitation in Ethernet LAN ? Draw frame format for IEEE 802.3 Ethernet Standard and explain in detail
4	Draw frame format of IEEE 802.3 LAN and explain each field in detail. Is efficiency of IEEE 802.3 LAN is function of Frame Size?
5	what is token ? Draw frame format for IEEE 802.4 LAN standard and explain in detail
6	what is token ? Draw frame format for IEEE 802.5 LAN standard and explain in detail
7	Give the comparison between different LAN Protocols?
8	Draw and Explain different LAN Topologies?
9	Explain in detail IEEE 802.15 Bluetooth Protocol
10	With the help of neat diagram explain protocol stack in bluetooth protocol

Unit-4

Sr. No	Question
1	What are different types of network devices ? Discuss each in brief
2	Explain Different types of Modems
3	List various network devices used in networking
4	Discuss the terms, Modems, switches, hubs, bridges?

5	Differentiate between Switches and Hubs
6	Differentiate between Routers and Switches
7	Compare Router , Switches, Gateways
8	What is Router ? Explain in detail
9	What is Switch? Explain in Detail
10	what is Hub ? Explain in Detail

Unit- 5

Sr. No	Question
1	Illustrate with a neat diagram working of TCP/IP in detail
2	Discuss the term Internet protocol ver. 4 (IPv4) in detail with its different types of notations
3	Give the difference between TCP/IP and UDP/IP
4	With a neat diagram discuss UDP header
5	Explain three way handshakes in TCP. What is the use of VER, HELN and TTL fields in case of IP?
6	Discuss TCP/IP header format, also describe how each field is used during communication?
7	What is host and net id in case of IP address? What is mask and subnetting related to IP? What are the classes of given IP address? i) 4. 23. 145. 90 ii) 156.64.37.210
8	What encapsulation and decapsulation in TCP/IP ? Discuss three way handshake in TCP
9	What is the difference between host to host and process to process communication?
10	Draw IP Header format and explain neatly
11	Draw UDP packet format and explain its header. Compare between TCP and UDP
12	Draw TCP/IP reference model and describe each layers function in detail.
13	what is encapsulation and de-capsulation in TCP/IP?
14	What are class full IP addresses and dotted decimal notation? Give address ranges of various IP class addresses.
15	Draw the TCP header format and explain each field in detail. List various features of TCP.
16	why IP is called best effort networks? What are different types of ICMP messages and their meaning?
17	What are different IP address classes ? Write ranges of different IP addresses. What is masking in case of IP ? What is network mask for IP address of 192.168.23.14 ?
18	Draw TCP/IP reference model and describe it in detail. What is congestion in TCP ?
19	What are physical, logical and port address related to TCP/IP ? Draw UDP datagram format and explain.
20	What is the meaning of default mask ? Find net-id and host-id for ‘137.7.21.64’ and ‘221.46.75.64’

21	What is dotted decimal notation in IPv4 ? Draw and describe special IPv4 Address formats.

Unit- 6

Sr. No	Question
1	Give comparison between virtual circuit & datagram approach.
2	Discuss the routing protocol with reference to shortest path algorithm.
3	What is principle of optimality and fairness in routing ? Discuss Flow based routing algorithm in detail.
4	What is principle of optimality and fairness in routing ? Discuss shortest path algorithm in detail.
5	Compare between virtual circuit and datagram approach.
6	Explain flow based routing protocol in detail.
7	Explain in detail shortest Path Protocol in Computer Networks
8	Explain in detail Distance Vector Routing Protocol in Computer Networks
9	Explain in detail Link state Routing Protocol in Computer Network
10	Explain BGP in detail
11	Explain OSPF in Detail
12	Compare BGP and OSPF

Unit- 7

Sr. No	Question
1	Explain in brief client server Architecture
2	Explain in detail use of Socket in Computer Networks
3	With Example explain client server Communication
4	Explain client server model briefly and discuss the characteristics of Client server model
5	List different types of servers that can be deployed
6	List different components in client server architecture
7	What are different architecture types in client-server model
8	Compare Peer to peer vs Client -Server Model

T.Y. (Electronics Engg) (Sem – II) (CBCS)

ELECTRONIC INSTRUMENTATION

Self-Learning Module

Question Bank-

Unit-1 - Qualities of Measurement

Sr. No	Question
1	What are the basic performance characteristics of a system?
2	What are dynamic characteristics of system?
3	What are the different types of static errors in a system?
4	What is the method used to calculate the errors in an instrument?
5	Describe primary standard and secondary standard.
6	Explain international and working standards of electronic instrument.
7	What are errors in measurement?
8	What are different sources of errors?
9	What is statistical analysis of measurements? Define terms- arithmetic mean, deviation from mean, average deviation, standard deviation
10	State the classification of standards.
11	What is the difference between secondary and working standards?
12	The current through resistor is 2.5A, but measurement shows value of 2.45 A. Calculate absolute error and the percentage of error in the measurement.

Unit-2- Signal Interference

Sr. No	**Question**
1	What is the necessity of signal conditioning in the instrument?
2	Draw block diagram of dc signal conditioning system and describe it
3	Draw block diagram of ac signal conditioning system and describe it
4	Draw diagram of instrumentation amplifier suing op-amp and describe it neatly
5	What is capacitive interference? What are the effects of capacitive interference?
6	How to reduce capacitive interference in the system.
7	What is inductive interference? What are the effects of inductive interference?
8	How to reduce inductive interference in the system.
9	What is electromagnetic interference? How to prevent EMI?
10	What is system grounding or earthing?
11	What is standard equipment grounding?
12	What is isolation and high frequency grounding?

Unit-3 - Measuring Instruments and Display Devices

Sr. No	Question
1	Draw block diagram of electronic counter and explain its functioning
2	What is universal counter? Describe universal counter
3	Draw block diagram of tachometer and describe its working
4	Explain working of digital pH meter with suitable diagram
5	List various display devices
6	Draw block diagram of LCD and explain it neatly
7	State the advantages and Disadvantages of LED & 7 segment displays
8	Mention the different materials used in LED.
9	State the applications , advantages and Disadvantages of LCD.
10	Compare between LCD and LED displays

Unit-4 - Signal Analyzers

Sr. No	Question
1	What are the types of harmonic distortion?
2	What is the difference between harmonic and inter-modulation distortions?
3	Define a Wave Analyzer and list its types.
4	State different types of Harmonic Distortion Analyzer
5	Mention the applications of Spectrum Analyzer
6	What is the function of wave analyzer?
7	Draw block diagram of spectrum analyzer and explain.
8	Describe logic timing analyzer
9	Describe logic state analyzer
10	What are the applications of vector analyzer?

Unit- 5 - Sensors:

Sr. No	Question
1	Describe construction of ultrasonic sensor.
2	Describe working principle of ultrasonic sensor and its technical specifications
3	How ultrasonic sensor is used for distance measurement?
4	What are the characteristics and applications of smart sensors?
5	Explain self-testing of smart sensor and their applications
6	Why are multiple sensors much more effective compared to using one?
7	What are benefits and design considerations in multi-sensor applications
8	List various types of sensors, their association with physical parameter measurement and technologies used for working

Unit- 6- Data Acquisition System

Sr. No	Question
1	State the Objective of a DAS
2	List the various characteristics of a modern data logger
3	What is a data logger?
4	Write the important factors present in Data Acquisition System
5	Write the characteristics of Data Logger
6	State the basic parts of a Data Logger Operation
7	What are the ways that the signal can be linearized in data logger?
8	State the applications of Data Loggers.
9	State the application of DAS.
10	Explain functioning of x-y recorder
11	Classify various recorders.

T.Y. (Electronics Engg) (Sem – II) (CBCS)

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Self-Learning Module

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T.Y. B. Tech (Electronics Engg/ Electronics & Telecomm Engg) (Sem – II) (CBCS)

OPERATING SYATEMS

Self-Learning Module

Question Bank-

Unit-1 - Introduction and Overview of Operating System

Sr. No	Question
1	What are the objectives of operating system?
2	What is the purpose of system programs/system calls?
3	How does an interrupt differ from a trap?
4	What are disadvantages of multi-processor systems
5	Defend timesharing differ from multiprogramming? If so, how
6	Distinguish between batch systems and time sharing systems
7	What is real time system?
8	What do you mean by system calls?
9	Define: process. What is process control block?
10	What is scheduler?
11	What are the use of job queues, ready queues and device queues?
12	What is meant by context switch?
13	What is the main advantage of multiprogramming?
14	Discuss the main advantages of layered approach to system design?
15	Define inter process communication
16	Illustrate the use of fork and exec system calls.
17	What are the main purposes of an operating system?
18	What are the five major activities of an operating system with regard to process management?
19	What are the three major activities of an operating system with regard to memory management?
20	What are the five major categories of System Calls?
21	Distinguish between hard real time systems and soft real time systems.

Unit-2- Process Management

Sr. No	**Question**
1	Compare and contrast Single-threaded and multi-threaded process
2	Distinguish between CPU bounded, I/O bounded processes
3	What resources are required to Creating threads?
4	Under what circumstances user level threads are better than the kernel level threads?
5	List out the data fields associated with process control blocks
6	What are the benefits of multithreaded programming?
7	Compare user threads and kernel threads.

8	What are the different ways in which a thread can be cancelled?
9	What are the various scheduling criteria for CPU scheduling?
10	What are the requirements that a solution to the critical section problem must satisfy?
11	What is process? Explain state transition diagram
12	Explain process control block
13	What is process management in OS?

Unit-3 - Process Scheduling & Synchronization

Sr. No	Question
1	Explain FCFS scheduling algorithm with an example.
2	Explain SJF scheduling mechanism
3	Explain SRTF F scheduling mechanism
4	Explain Round Robin scheduling mechanism
5	Explain priority-based scheduling mechanism
6	Examples on all above-mentioned scheduling criteria to find turn around time and waiting time
7	Define race condition, mutual exclusion, turn around time, throughput, critical section, waiting time and response time
8	What is inter process communication? Explain different types of IPC
9	How critical section problem is overcome?

Unit-4 - Deadlock

Sr. No	Question
1	What is deadlock?
2	Explain preemptable and non- preemptable resource with illustration
3	List and discuss condition responsible for deadlock in OS
4	Explain deadlock handling policies
5	How deadlock can be avoided
6	What do you mean by deadlock ignorance?
7	What is resource allocation graph?
8	What is Banker's algorithm to detect deadlock?
9	Numerical on RAG.
10	Numerical on Banker's algorithm

Unit- 5 - Memory Management

Sr. No	Question
1	How is memory allocated to new program in secondary storage?
2	What are different types of memory allocation?
3	What is internal fragmentation? How to get rid of it?
4	What is external fragmentation? How to get rid of it?
5	How memory partitions can be allocated to new file?

6	What is virtual memory? Explain in detail
7	What is paging? How conversion of virtual address to physical address.
8	Explain page table.
9	What is demand paging?
10	What is segmentation?
11	Discuss problems associated with paging and its solution

Unit- 6- Virtual Memory

Sr. No	Question
1	What are the steps required to handle a page fault in demand paging? (
2	What do you meant by thrashing? How to prevent it
3	What is the basic approach for page replacement?
4	What you mean by compaction? In which situation is it applied.
5	List the steps needed to handle page fault.
6	How is memory protected in a paged environment
7	What are the major problems to implement Demand paging?
8	What is the use of Valid-Invalid Bits in Paging?
9	What ate the differences between logical and physical addresses.
10	Explain about given memory management techniques. (i) Partitioned allocation (ii) Paging and translation look-aside buffer
11	Analysis of FIFO, LRU and optimal page replacement policies to decide page faults and page hits
12	What is Belady's anomaly? Why is Belady's anomaly is present in FIFO page replacement algorithm?

Unit- 7- File System

Sr. No	Question
1	Explain file attributes and file operations.
2	Explain directory structure in brief
3	Discuss various directory operations in brief
4	Explain disk files system management and optimization
5	What are the aspects of file allocation?
6	Discuss different file allocation methods.
7	What is free space management?
8	How the free space list can be implemented?

Class: T.Y.B.Tech., Sem-II, Mechanical Engineering

Subject : HEAT TRANSFER (Question Bank)
Exam:May/June 2022
Pattern: CBCS (New w.e.f. Nov.-2020)

Q.No.	Questions
01.	Explain analogy between electric circuit and thermal circuit
02.	Define thermal conductivity. What are its units? Explain the effect of temperature on thermal conductivity for solid, liquid and gases.
03.	What is mean by thermal resistance? Explain the electrical analogy for solving heat transfer problems
04.	Explain physical significance of Thermal Diffusivity
05.	Differentiate between steady state heat transfer and unsteady state heat transfer problems.
06.	Derive the general heat conduction equation in three dimension in Cartesian coordinates?
07.	Explain the concept of critical radius of insulation and derive an expression for critical radius of insulation in case of cylinder
08.	Derive an expression for steady state one dimensional heat flow through the hollow cylinder without heat generation.
09.	Derive an expression for temperature distribution in a cylinder of radius 'R' with uniformly distributed heat sources and constant thermal conductivity (K).
10.	Prove that the temperature distribution in a body at time 't' during Newtonian heating or cooling is given by, $(T-T_0)/(Ti-T_0) = e^{-Bi.Fo}$
11.	An electrical cable of 20 mm diameter is insulated with rubber which is exposed to atmosphere at 30 ^{0}C, Calculate the most economical thickness of insulation of K= 0.175 W/mK, when cable surface temperature with and without insulation is 70 ^{0}C. Also calculate % increase in heat dissipation when more economical thickness of insulation is provided. Take h=9.3 W/m^{2}K.
12.	Derive an equation for temperature distribution and heat flow rate for fin having infinite length.
13.	Derive an equation for temperature distribution and heat flow rate for fin having finite length with convective tip .
14.	The rod of copper protrudes from a wall which is at 300 ^{0}C . The other end of the rod is inside the room where the temperature is 15 ^{0}C. The rod is 3 mm in diameter and 30 mm in length. The heat transfer coefficient between rod surface and environment is 30 W/m^{2}K. Estimate the total heat dissipated by the rod if thermal conductivity of the rod is 300 W/mK. Also determine the temperature of the rod at 15 mm from the wall . Assume rod as infinite length fin.
15.	A metal rod of 10 mm in diameter and 1m long initially at 400 ^{0}C is quenched in oil with controlled environment at 90 ^{0}C for which heat transfer coefficient is 250 W/m^{2}K. Determine the time taken by the rod to reach at 200 ^{0}C. Take thermo-physical properties for rod as C= 360 J/kg.K

	K= 70 W/mK ρ =8000 Kg/m3
16.	Explain the effect of Biot number on effectiveness of fins.
17.	State the assumptions made in lumped heat capacity analysis and derive expression for temperature distribution of a body subjected to heating and cooling in terms of Fourier and Biot Number.
18.	State and explain Fourier's law of heat conduction
19.	Derive an expression for steady state one dimensional heat flow through the hollow sphere without heat generation
20.	A nichrome wire having resistivity of 110 micro-ohm.cm is to be used as a heating element. The wire diameter is 2 mm and other design features are current, I=25A. Ambient temperature, T_0=20 ^{0}C $K_{nichrome}$ =17.5 W/mK Convection coefficient, h=46.5 W/m^{2}K. Calculate the heat loss from 1m long heater and also the temperature at the surface and center line of nichrome wire.
21.	An exterior wall of house consists of a 10.16 cm layer of common brick having thermal conductivity 0.7 W/mK. It is followed by a 3.8 cm layer of gypsum plaster with thermal conductivity of 0.48 W/mK, what thickness of loosely packed rockwool insulation (k=0.065 W/mK) should be added to reduce the heat loss through the wall by 80%.
22.	An electric cable of 10 mm diameter is to be laid in atmosphere at 20°C. The estimated surface temperature of the cable due to heat generation is 65 °C. Find the maximum percentage increase in heat dissipation when the wire is insulated with rubber having K = 0.155 W/mk. Take h = 8.5 w/m^{2}k
23.	A solid steel ball 5 cm in diameter and initially at 450 ^{0}C is quenched in a controlled environment at 90 ^{0}C with convective coefficient of 115 W/m^{2}K. Determine the time taken by the centre to reach at temperature of 150 ^{0}C. Take thermo-physical properties as: C = 420 J/kgK, ρ = 8000 kg/m^3, K = 46 W/mK.
24.	A furnace wall is made up of silica brick [k=1.6 W/mK], outside magnesia brick [k=4.8 W/mK], 10 cm thick each. The inside and outside surfaces are exposed to fluid temperatures of 820 ^{0}C and 120 ^{0}C respectively. Find the heat flow through the wall per m^2 area. The inside and outside heat transfer coefficients are 35 W/m^{2}K and 12 W/m^{2}K respectively
25.	A concrete dam 10 m high and 20 m long is having an average thickness of 1m. The hydration of concrete [K=1 W/mK] results in evolution of heat equal to 60 W/m^3. Considering dam to be an infinite slab, calculate the maximum temperature in the concrete. Given ambient temperature =35 ^{0}C and surface heat transfer coefficient =h= 10 W/m^{2}K.
26.	A Copper pipe (k = 396 w/mK) with 50 mm outer diameter and 25 mm inner diameter is covered with 15 mm thick fibre glass insulation (k = 0.048 W/mK) followed by 7 mm thick layer of plaster of Paris (k = 0.125 W/mK). The inner pipe wall temperature is 240 °C and outside temperature is 32 °C. Calculate interface temperature between fiber glass insulation and plaster of Paris. Take L = 1m.
27.	A very long copper rod (k=396 W/mK) of 25 mm diameter has one end maintained at100 ^{0}C. The surface of the rod is exposed to air at 25 ^{0}C with convective heat transfer coefficient of 10 W/m^{2}K. Calculate the heat loss from the rod and estimate how long the rod must be to be considered infinite?

28.	An aluminium rod 2.5 cm in diameter and 10 cm long protrudes from a wall surface which is maintained at 250 °C. The rod is exposed to an environment at 15 °C. Convective heat transfer co-efficient is 15 W/m^2K. Calculate heat lost by rod. Assume rod tip is insulated.Take $K_{aluminium}$ = 200 W/mK. Also find fin efficiency and temperature at end of fin.
29.	An aluminium alloy fin [K=200 W/mK], 3.5mm thick and 2.5 cm long protrudes from a wall. The base is at 420 ^{0}C and ambient air temperature is 30 ^{0}C. The heat transfer coefficient may be taken as 11 W/m^2K. Find the heat loss and fin efficiency, if the heat loss from the tip of the fin is negligible.
30.	A pin fin 2.5 mm diameter is made of copper [K= 396W/mK]. It protrudes from a wall maintained at 95 ^{0}C and placed in air at 25 ^{0}C. The convective heat transfer coefficient over fin is 10 W/m^2K. Calculate heat losses when a) Fin length is 25 mm. b) Fin length is infinite.
31.	A turbine blade of stainless steel (k = 29 W/m°C) is 60 mm long, 500 mm^2 cross-sectional area and 120 mm perimeter. The temperature of the root blade is 480 °C and it is exposed to products of combustion passing through the turbine at 820 °C. If the film coefficient between the blade and the combustion gases is 320 W/m°C, determine i) The temperature at the middle of the blade; ii) The heat flow rate from the blade.
32.	State and explain Planck's law of radiation
33.	Write a short note on 'Laws of Radiation'.
34.	Explain the concept of shape factor. State and explain properties of shape factor
35.	Calculate shape factor for cylindrical cavity having diameter 'D' and length 'L' with respect to itself.
36.	Explain the following terms: a) Solid angle. b) Radiosity. c) Irradiation
37.	Write a short note on: a) Lambert's cosine rule. b) Radiation shield.
38.	Calculate the net radiant heat exchange per m^2 area for two large parallel plates at temperatures of 900 ^{0}C and 500 ^{0}C respectively. Emissivity's for hot and cold plates are 0.45 and 0.65 respectively.
39.	Find the shape factor of a conical cavity having semi vertex angle 'α' with respect to itself.
40.	Explain briefly the concept of Radiosity and Irradiation. Describe the construction of radiation network diagram for determining radiant heat exchange between two grey bodies.
41.	A pipe carrying steam having an outside diameter of 20 cm runs in a large room and is exposed to air at a temperature of 30 ^{0}C. The pipe surface temperature is 400 ^{0}C. Calculate the heat loss to the surrounding per square meter length of pipe due to thermal radiation. The emissivity of pipe surface is 0.8.What would be the loss of heat due to radiation, if the pipe is enclosed in a 50 cm diameter brick conduit of emissivity of 0.9?

42.	Two parallel plates at T_1=900 K and T_2=500 K have emissivity ϵ_1=0.6 and ϵ_2=0.9 respectively. A radiation shield having emissivity ϵ_3=0.15 is placed between the plates. Calculate the heat transfer rate by radiation per square meter with and without radiation shield.
43.	Two large parallel plates at temperature 1000 K and 600 K have emissivity of 0.5 and 0.8 respectively. A radiation shield having emissivity 0.1 on one side and 0.05 on other side is placed between the plates. Calculate the heat transfer rate by radiation per square meter with and without radiation shield .
44.	Determine the heat loss by radiation from a steel tube of outside diameter70 mm and 3 m long at a temperature of 500 K if the tube is located within a square brick conduit of 0.3m side and same length at 300 K. Take Steel $\varepsilon = 0.79$ and Brick $\varepsilon = 0.93$. (Take $\sigma = 5.678 \times 10–8$ W/m^{2}K4).
45.	Consider two large parallel plates at $T_1 = 727°C$ with emissivity of 0.8 and other at $T_2 = 227°C$ with emissivity of 0.4. An aluminium radiation shield with an emissivity of 0.05, on both sides is placed between the two plates as a result of the shield. Calculate temperature of radiation shield. (Take = $5.678 \times 10–8$ W/m^2 K^4).
46.	Distinguish between free and forced convection. Give at least two examples of each.
47.	Write the significance of Reynolds number, Nusselts number, Prandtl Number. Grashoffs number
48.	Why are the heat transfer coefficients for natural convection much less than those in forced convection?
49.	What is velocity and thermal boundary layer? Explain significance of these boundary layers for various types of fluids
50.	Show by dimensional analysis,Nu = f (Re,Pr) for forced convection
51.	Show by dimensional analysis,Nu = f (Re,Gr) for natural convection
52.	Define and explain the terms: a) Buoyancy force. b) Coefficient of volumetric expansion. c) Grashoff's number. d) Prandtl number.
53.	Assuming a man as a cylinder of 40 cm diameter and 1.72 m high with a surface temperature of 37 ^{0}C, calculate the heat loss from his body, while standing in wind flowing at 20 km/h at 17 ^{0}C. Use the relation $Nu = 0.027(Re)^{0.805}(Pr)^{1/3}$ Properties of air at 300 K are, $\rho = 1.1614$k g/m^3, Pr = 0.707, $\mu = 184.6X10\text{-}7$ Ns/m^2, K = 0.0263W/mK, Cp = 1.007 KJ/kgK.
54.	Liquid mercury flows at a rate of 1.6 kg/s through a copper tube of 20 mm diameter. The mercury enters the tube at 15 ^{0}C and after getting heated it leaves at 35 ^{0}C. Calculate the tube length for constant heat flux at the wall which is maintained at an average temperature of 50 ^{0}C. Properties of mercury at 25 ^{0}C are : ϱ =13582 kg/m^3, Cp=140 J/kg 0C K = 8.69 W/m^{0}C $\upsilon = 1.5$ x 10-7 m^2/s Pr =0.0248 Use the empirical correlation : $Nu = 7 + 0.025\ (Re.Pr)^{0.8}$
55.	Two horizontal steam pipes having diameters 100 mm and 300 mm are so laid in a boiler house that mutual heat transfer may be neglected. The surface temperature of

	each of steam pipes is 480 ^{0}C. If these pipes are exposed in ambient at 30^{0}C, calculate the ratio of heat transfer coefficients and ratio of heat losses per meter length of the pipes. Use the relation $Nu = C.(Gr.Pr)^{1/4}$
56.	A square duct of 30cm x 30cm carries conditioned air at a temperature of 150C and exposed to room air at 250C. Calculate the heat gained by the duct per meter length assuming the duct runs horizontal. The properties of air at 20^{0}C are, $\rho = 1.205$ kg/m^3, $\gamma = 15.06 \times 10^{-6}$ m^2/s, $\mu = 18.17X10^{-6}$ kg/ms, K = 0.0256 W/mK, $C_p = 1006$ J/kgK Use correlation $Nu = 0.53\ (Gr.Pr)^{1/4}$
57.	In a certain glass making process, a square plate of glass 1m^2 area and 3 mm thick heated uniformly to 90^{0}C is cooled by air at 20^{0}C flowing over both sides parallel to the plate at 2 m/s. Calculate heat transfer from both sides of the plate. The properties of air are, $\rho = 1.076$ kg/m^3, $\mu = 19.8 \times 10^{-6}$ Ns/m^2, $C_p = 1008$ J/kgK, K = 0.0286 W/mK $Nu = 0.664(Re)^{0.5}(Pr)^{1/3}$
58.	A fine wire having a diameter of 0.02 mm is maintained at a constant temperature of 54 ^{0}C by an electric current. The wire is exposed to air at 1atm & 0 ^{0}C. Calculate the electric power necessary to maintain the wire temperature if the length is 50 cm. The properties of air are, $\gamma = 15.69 \times 10^{-6}$ m^2/s $\beta = 1/300$ K^{-1} K = 0.02624 W/mK Pr = 0.708 $Nu = 0.675(Gr.Pr)^{0.058}$
59.	A large vertical plate 4 m height is maintained at 60 °C and exposes to atmospheric air at 10°C. Calculate the rate of heat transfer of the plate is 10 m wide. Use the correlation as, $Nu = 0.10(Gr.\ Pr)^{1/3}$ Properties of air at 308 K are K = 0.027 W/mK, $\upsilon = 16.5 \times 10–6$ m2/s Pr = 0.7.
60.	Write a shot note on classification of heat exchangers.
61.	Why counter flow heat exchanger is more effective than parallel flow heat exchanger?
62.	Derive an expression to determine the LMTD for parallel flow heat exchanger
63.	Derive an expression to determine the LMTD for counter flow heat exchanger
64.	Derive an expression for determining the effectiveness of parallel flow heat exchanger.
65.	Derive an expression for determining the effectiveness of counter flow heat exchanger.
66.	Describe the significance of fouling factor in case of heat exchanger
67.	What are the other design consideration in heat exchangers

68.	Hot oil with a capacity rate of 2500 W/K flows through a double pipe heat exchanger. It enters at 360 ^{0}C and leaves at 300 ^{0}C. Cold fluid enters at 30 ^{0}C and leaves at 200 ^{0}C. If the overall heat transfer coefficient is 800 W/m^{2}K, determine the heat exchanger area required for (a)parallel flow and (b) counter flow
69.	The temperature of hot fluid is reduced from 100 ^{0}C to 60 ^{0}C which the temperature of the cold fluid is increased from 25 ^{0}C to 50 ^{0}C in a heat exchanger. Find the LMTD and effectiveness of the heat exchanger when the flow arrangement is a) Parallel flow. b) Counter flow.
70.	A counter flow heat exchanger is used to cool 0.55 kg/s (C_p=2.45 KJ/kgK) of oil from 115 ^{0}C to 40 ^{0}C by using water. The inlet and outlet temperatures of cooling water are 15 ^{0}C and 75 ^{0}C respectively. The overall heat transfer coefficient is 1450 W/m^{2}K Using NTU method, calculate: a) Mass flow rate of water. b) The effectiveness of heat exchanger. c) The surface area required.
71.	The flow rate of hot and cold water streams running through a parallel flow heat exchanger are 0.2 kg/s and 0.5 kg/s respectively. The inlet temperatures on hot and cold sides are 75 ^{0}C and 20 ^{0}C respectively. The exit temperature of hot water is 45 ^{0}C. If the individual heat transfer coefficients on both sides are 650 W/m^2 ^{0}C, calculate area of the heat exchanger.
72.	16.5 kg/s of chemical product at 650 °C having Cp = 3.55 kJ/kgK in a chemical plant are to be used to heat 20.5 kg/s of incoming fluid from 100 °C having C_p = 4.2 kJ/kgK. If U = 0.95 kW/m$_2$K and heat transfer area is 44 m^2. Calculate fluid outlet temperature for counter flow heat exchanger.
73.	A parallel flow heat exchanger is used to cool 3600 kg/hr of oil (C_p = 2000 J/kgK) at 150 °C with the help of water (C_p = 4187 J/kgK) flowing at the rate of 3710 kg/hr. Water enters at 25 °C. The overall heat transfer co-efficient is 500 W/m^{2}K and surface area is 4.872 m^2. Calculate exit temperatures of oil and water by using NTU-effectiveness method.
74.	A parallel flow heat exchanger is required to cool 55000 kg/h of alcohol (C_p = 3810 J/kgK) from 66 °C to 40 °C using 40000 kg/h of water (C_p = 4187 J/kgK) entering at 5 °C. If the overall heat transfer co-efficient is 450 W/m^{2}K calculate : i) Exit temperature of water ii) Heat transfer rate iii) Surface area required
75.	Differentiate between filmwise condensation and dropwise condensation.
76.	Elaborate the difference between film boiling and nucleate boiling.
77.	Define Condensation and explain its types.
78.	Explain the various regimes of pool boiling curve with neat sketch
79.	Define Boiling and explain its types.
80.	Differentiate between boiling and condensation.

T.Y. B. Tech (Electronics Engg/ Electronics & Telecomm Engg) (Sem – II) (CBCS)

OPERATING SYATEMS

Self-Learning Module

Question Bank-

Unit-1 - Introduction and Overview of Operating System

Sr. No	Question
1	What are the objectives of operating system?
2	What is the purpose of system programs/system calls?
3	How does an interrupt differ from a trap?
4	What are disadvantages of multi-processor systems
5	Defend timesharing differ from multiprogramming? If so, how
6	Distinguish between batch systems and time sharing systems
7	What is real time system?
8	What do you mean by system calls?
9	Define: process. What is process control block?
10	What is scheduler?
11	What are the use of job queues, ready queues and device queues?
12	What is meant by context switch?
13	What is the main advantage of multiprogramming?
14	Discuss the main advantages of layered approach to system design?
15	Define inter process communication
16	Illustrate the use of fork and exec system calls.
17	What are the main purposes of an operating system?
18	What are the five major activities of an operating system with regard to process management?
19	What are the three major activities of an operating system with regard to memory management?
20	What are the five major categories of System Calls?
21	Distinguish between hard real time systems and soft real time systems.

Unit-2- Process Management

Sr. No	**Question**
1	Compare and contrast Single-threaded and multi-threaded process
2	Distinguish between CPU bounded, I/O bounded processes
3	What resources are required to Creating threads?
4	Under what circumstances user level threads are better than the kernel level threads?
5	List out the data fields associated with process control blocks
6	What are the benefits of multithreaded programming?
7	Compare user threads and kernel threads.

8	What are the different ways in which a thread can be cancelled?
9	What are the various scheduling criteria for CPU scheduling?
10	What are the requirements that a solution to the critical section problem must satisfy?
11	What is process? Explain state transition diagram
12	Explain process control block
13	What is process management in OS?

Unit-3 - Process Scheduling & Synchronization

Sr. No	Question
1	Explain FCFS scheduling algorithm with an example.
2	Explain SJF scheduling mechanism
3	Explain SRTF F scheduling mechanism
4	Explain Round Robin scheduling mechanism
5	Explain priority-based scheduling mechanism
6	Examples on all above-mentioned scheduling criteria to find turn around time and waiting time
7	Define race condition, mutual exclusion, turn around time, throughput, critical section, waiting time and response time
8	What is inter process communication? Explain different types of IPC
9	How critical section problem is overcome?

Unit-4 - Deadlock

Sr. No	Question
1	What is deadlock?
2	Explain preemptable and non- preemptable resource with illustration
3	List and discuss condition responsible for deadlock in OS
4	Explain deadlock handling policies
5	How deadlock can be avoided
6	What do you mean by deadlock ignorance?
7	What is resource allocation graph?
8	What is Banker's algorithm to detect deadlock?
9	Numerical on RAG.
10	Numerical on Banker's algorithm

Unit- 5 - Memory Management

Sr. No	Question
1	How is memory allocated to new program in secondary storage?
2	What are different types of memory allocation?
3	What is internal fragmentation? How to get rid of it?
4	What is external fragmentation? How to get rid of it?
5	How memory partitions can be allocated to new file?

6	What is virtual memory? Explain in detail
7	What is paging? How conversion of virtual address to physical address.
8	Explain page table.
9	What is demand paging?
10	What is segmentation?
11	Discuss problems associated with paging and its solution

Unit- 6- Virtual Memory

Sr. No	Question
1	What are the steps required to handle a page fault in demand paging? (
2	What do you meant by thrashing? How to prevent it
3	What is the basic approach for page replacement?
4	What you mean by compaction? In which situation is it applied.
5	List the steps needed to handle page fault.
6	How is memory protected in a paged environment
7	What are the major problems to implement Demand paging?
8	What is the use of Valid-Invalid Bits in Paging?
9	What ate the differences between logical and physical addresses.
10	Explain about given memory management techniques. (i) Partitioned allocation (ii) Paging and translation look-aside buffer
11	Analysis of FIFO, LRU and optimal page replacement policies to decide page faults and page hits
12	What is Belady's anomaly? Why is Belady's anomaly is present in FIFO page replacement algorithm?

Unit- 7- File System

Sr. No	Question
1	Explain file attributes and file operations.
2	Explain directory structure in brief
3	Discuss various directory operations in brief
4	Explain disk files system management and optimization
5	What are the aspects of file allocation?
6	Discuss different file allocation methods.
7	What is free space management?
8	How the free space list can be implemented?

Unit: 1; Reservoir Capacity and sedimentation

Q. No **Question Statement**

1. Explain various types of reservoirs. What do you understand by multipurpose reservoir?

2 Describe briefly the techniques that are used for computing the storage capacity of reservoirs at different water surface elevations.

3 Annual runoff in terms of depth over catchment area of 1675 sq.km of reservoir is given below.

Year	1962	1963	1964	1965	1966	1967	1968	1969
Runoff (cm)	99	143.5	168.3	97	95.3	152.4	110	131.3

Draw the mass inflow diagram. What is average yield of catchment? What should be live storage capacity of the reservoir to use the source fully? If the dead storage is to be 20 % of the live storage, what should be the gross storage? Mark the filling and emptying periods on the mass curve?

4 Classify various types of dams according to construction material used. Distinguish clearly between rigid and non-rigid dams.
How the dams are classified? Discuss in detail.

5 Discuss with neat sketch, the various storage zones and control levels of the dam reservoir.

6 Define : a) Surcharge Storage b) Valley Storage c) Safe Yield d) Secondary Yield

7 What do you understand by demand curve? Explain the method of calculating reservoir capacity for a specific yield, from the mass inflow curve.
What do you understand by demand curve? Explain the integration technique of finding capacity of reservoir?

8 Write a note on reservoir sedimentation and various methods of reservoir sediment control.
Discuss the reservoir sedimentation phenomenon. What are the factors affecting reservoir sedimentation?
What is mean by reservoir sedimentation? Explain different methods of control of reservoir siltation.

9 What are the factors affect the selection of site for a Dam? Discuss briefly.
Discuss the factors which are considered for the selection of site for a reservoir.

10 What is mean by trap efficiency of reservoir? Explain in brief.
Enlist the factors on which rate of silting of an impounding reservoir depends. What is trap efficiency of reservoir?

<table>
<tr><td>11</td><td>Discuss the various factors which govern the selection of particular dam for a particular project.</td></tr>
<tr><td>12</td><td>Discuss briefly with necessary sketches, the demand patterns for the following two types of reservoirs: i) Single purpose conservation reservoir ii) Single purpose flood control reservoir.</td></tr>
<tr><td>13</td><td>Explain mass curve method that can be used for determining reservoir capacity for fulfilling the given demand.
Explain the mass curve method for fixing the capacity of a dam reservoir at a particular site, provided the inflow and demand patterns.</td></tr>
<tr><td>14</td><td>Differentiate clearly between the following
a) A flood control reservoir and a multipurpose reservoir
b) A retarding basin and storage reservoir.</td></tr>
<tr><td>15</td><td>An impounding reservoir had original storage capacity for 738 ha-m. the drainage area of the reservoir is 80 sq. km. from which annual sediment discharge into the reservoir at the rate of 0.1153 ha-m per sq.km. Of the drainage area. Assuming the trap efficiency as 80 percent, find the annual capacity loss of the reservoir in percent per year.</td></tr>
<tr><td>16</td><td>What are elevation capacity curve and Elevation-Area curve of dam reservoirs? Draw typical curves and explain the utility.</td></tr>
<tr><td>17</td><td>The amount of water flowing from certain catchment area at the proposed dam site is tabulated as below. Determine
i. Minimum capacity of reservoir if the water is to be used to feed the turbines of hydropower plant at uniform rate and no water is to be spilled over.
ii. The minimum storage capacity of reservoir necessary to satisfy uniform demand calculated as above.

<table>
<tr><td>Month</td><td>Jan</td><td>Feb</td><td>Mar</td><td>Apr</td><td>May</td><td>Jun</td></tr>
<tr><td>Inflow *10^{5}m^3</td><td>2.93</td><td>4.25</td><td>5.66</td><td>18.4</td><td>22.64</td><td>22.64</td></tr>
<tr><td>Month</td><td>July</td><td>Aug</td><td>Sept</td><td>Oct</td><td>Nov</td><td>Dec</td></tr>
<tr><td>Inflow *10^{5}m^3</td><td>19.81</td><td>8.99</td><td>8.10</td><td>7.10</td><td>5.65</td><td>6.65</td></tr>
</table>
</td></tr>
</table>

Unit : 2: Gravity Dam and Arch Dam

Q. No	Question Statement
1	What are the methods adopted to reduce uplift in concrete dam?
2	Figure shows a section of non-overflow section of a gravity dam built of concrete, Calculate the maximum vertical stress at the heel and toe of the dam. Assume weight of concrete as 33.5 kN/m^3. Neglect earthquake effects, Refer figure below

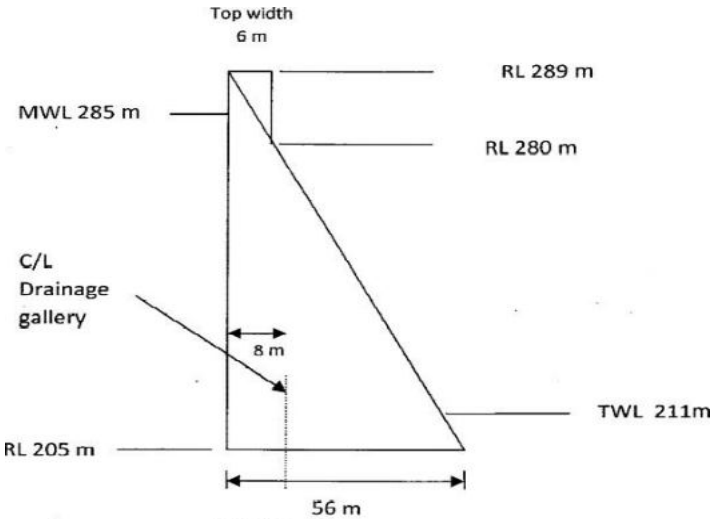
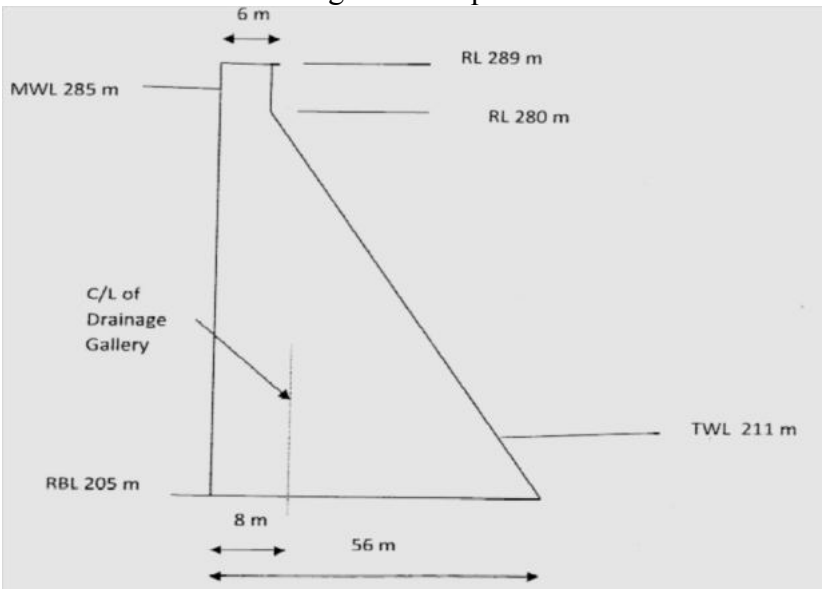


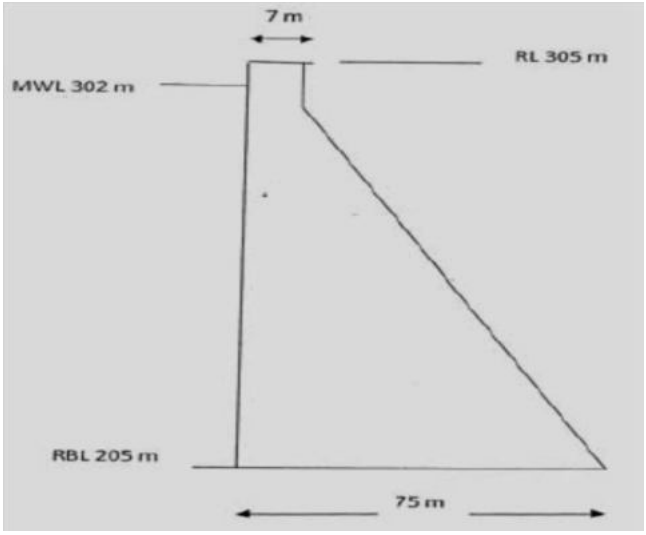
Figure – 1

3	Figure shows a section of a non overflow portion of a gravity dam built of concrete. Calculate the maximum vertical stress at the heel and toe of the dam. Assume unit weight of concrete as 22.5 kN/m^3. Neglect earthquake forces.

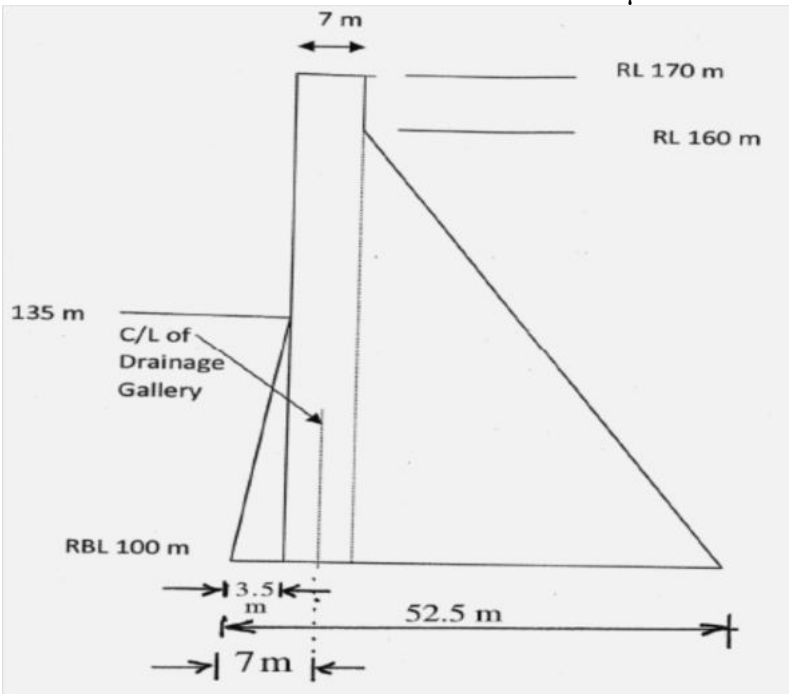


3 Explain how will youaccount for earthquake forces in the design of gravity dams. What are the methods adopted to reduce uplift in masonry dam?

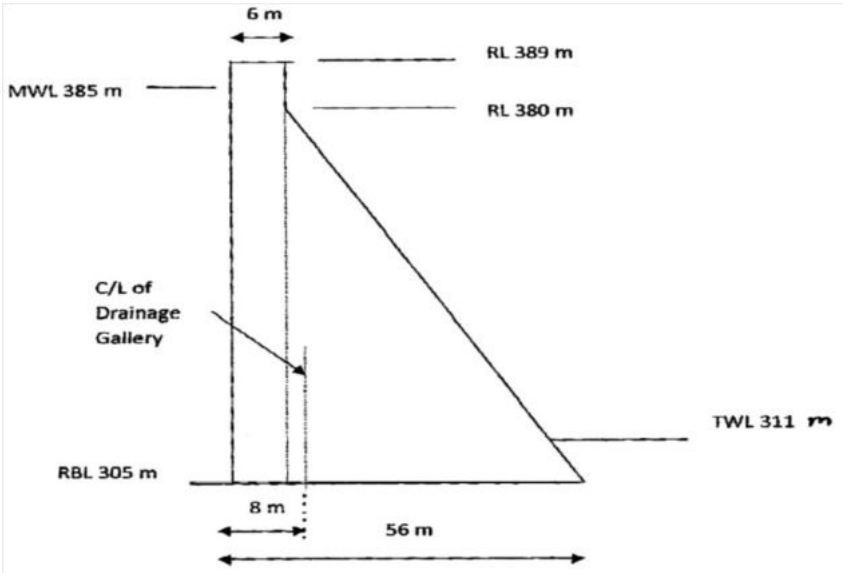
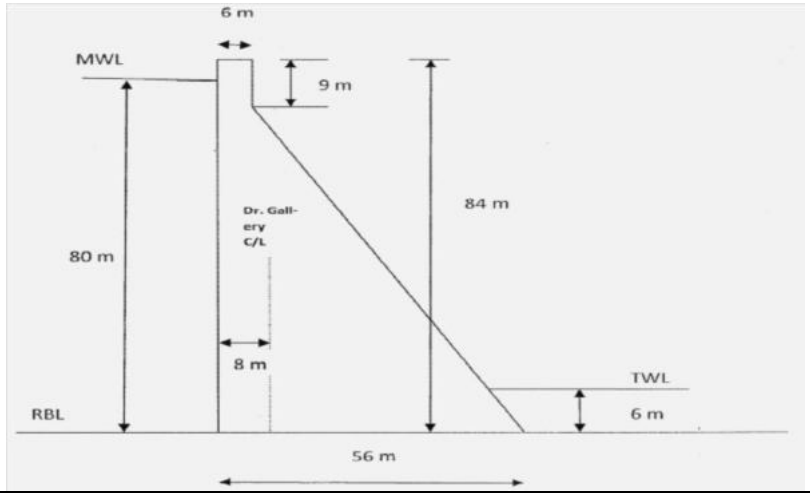
5 Figure shows profile of a gravity dam with maximum water level asshown; If the coefficient of friction between dam and foundations is 0.57, is the dam safe against sliding? Take unit weight of concrete as 27 kN/m^3

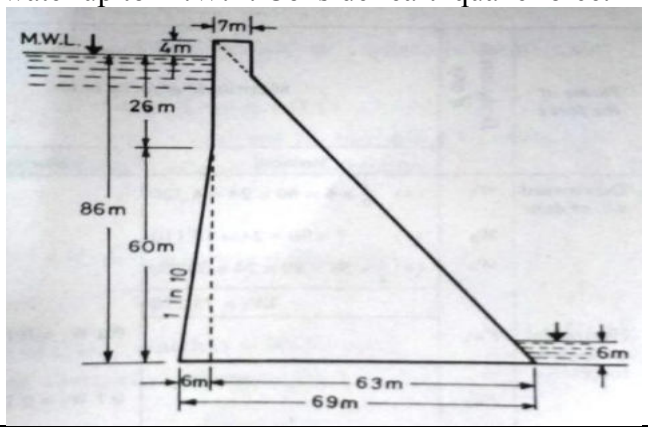
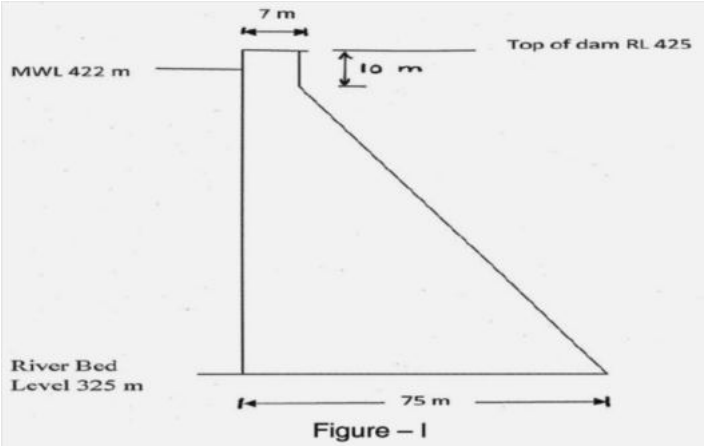


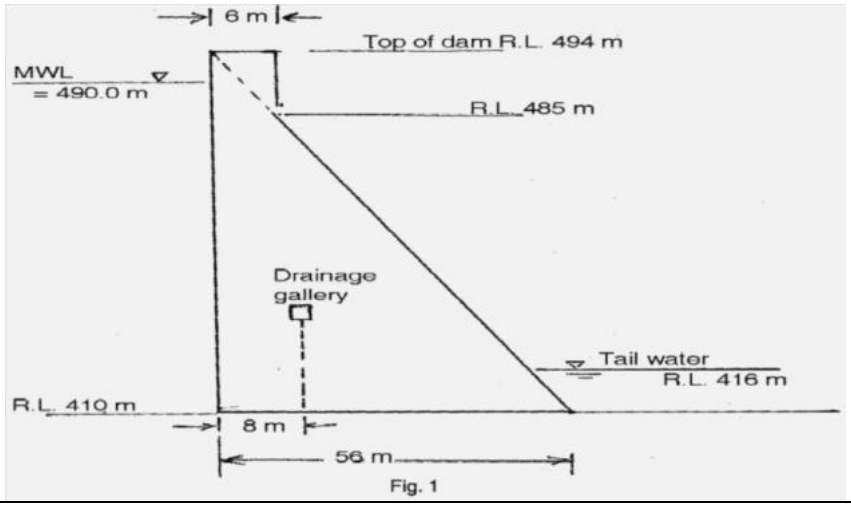
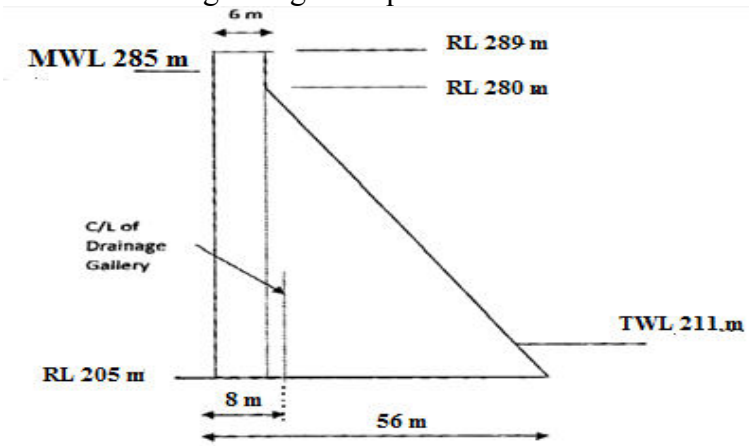
6 Figure shows a section of a non-overflow portion of a gravity dam built of concrete. Check stability of the section for reservoir full condition with uplift. For purpose of the check, assume water level up to the top of the dam and no tail water. Neglect seismic forces. Assume 50% uplift acting at a line of drain holes. Also find principal and shear stresses at the toe and heel of the dam. Take unit weight of concrete as 25 kN/m^3, shear strength of concrete as 1470 kN/m^2 and coefficient of friction μ =0.9



7 With neat sketch explain various forces acting on Gravity Dam.

8	What is meant by the elementary profile of a gravity dam and how is it deducted? What should be the maximum depth if elementary profile of a dam if the sale limit of stress on the masonry should not exceed 1575 kN/ per m^2?
9	Briefly explain the functions of the following: 1. Drainage gallery in a gravitydam 2. Construction joints in a concrete gravitydam
10	Figure shows a section of a non-overflow portion of a gravity dam built of concrete. Unit weight of concrete is 29.5 kN/m^3. Allowable stress in concrete may be taken as 2750 kN/m^2. Neglecting earthquake effects, determine. I. Maximum vertical stress at the toe and heel of thedam II. Major principal stress at toe of thedam III. Intensity of shear stress on horizontal plane near thetoe. 
11	Figure shows a section of a gravity dam (non overflow section) built of concrete. Calculate the maximum vertical stress at the heel and toe of the dam, when water level at maximum water level. Assume unit weight of concrete as 25.7 kN/m^3. Neglect earthquake forces. 
12	What is meant by the term 'low gravity dam'? Determine the dimensions of the elementary profile of a low gravity dam What is mean by Elementary profile of a gravity dam and how it is deducted? What should be maximum height or elementary profile, if safe limit of stress on masonry

	should not to exceed 1700 KN/m^2
13	What do you meant by Elementary profile of a gravity dam? What are its dimensions? How the profile is modifies into practical profile?
14	Discuss with neat sketches, the profile of variable radius archdam.**OR** Differentiate between constant radius and constant angle of Arch dam. What is the best value of angle for constant angle Arch dam?
15	Discuss with neat sketches the profile of Variable Radius Arch Dam.
16	For the section of gravity dam as shown below calculate, i) Maximum vertical stresses at toe and heel of dam. ii) Major principle stresses at toe of dam. iii) Intensity of shear stress on horizontal plane near toe. Assume unit weight of concrete = 24.5 KN/m^2. Allowable compressive stress in concrete= 2600 KN/m^2. Allowable shear stress in concrete = 429 KN/m^2. Assume that reservoir is full of water up to M.W.L. Consider earthquake force. 
17	A profile of a gravity dam is shown in figure (I) with the important levels. If the coefficient of friction between dam and foundations is 0.85, is the dam safe against sliding? Take unit weight of concrete as 25 kN/m^3. Assume Horizontal Earthquake coefficient as 0.05 g and there is no tail water. Neglect uplift.  Figure – I
18	Classify various types of dams according to construction materials used. Distinguish clearly between rigid and non-rigid dams
19	Figureshowsthesectionofagravitydam(non- overflowportion)builtofconcrete. Calculate (neglecting earthquake effects) i. The maximum vertical stresses at toe and heel of thedam ii. The major principal stresses at the toe of thedam iii. Intensity of shear stress on a horizontal plane neartoe

	Assume unit weight of concrete = 24.5 kN/m2. Allowable compressive stress in concrete = 2600 kN/m^2 . Allowable shear stress in concrete = 430 kN/m^2. Assume that water level in reservoir at M.W.L.  Fig. 1
20	The following are the details of straight gravity concrete dam. Foundation level, R.L. = 207.00 m, height of dam = 100 m, maximum u/s water surface elevation, R.L. = 304.00 m, top width 8 m, base width 76 m, upstream face is vertical and downstream face is vertical up to R.L. 300.00 m. Assume no tail water and no gallery. Justify whether the dam is safe against overturning or not. Take unit weight of concrete as 24 kN/m3 and coefficient of friction between dam and foundation as 0.8
21	Figure shows a section of a non-overflow portion of a gravity dam built of concrete. Calculate the maximum vertical stress at the heel and toe of the dam. Assume weight of concrete is 24.5 Kn/m^3. Neglecting earthquake effects. And considering it 
22	Distinguish between 1. Constant angle and constant radius arch dam

Unit: 3: Earthen Dam

Q. No.	Statement
1	Enumerate different types of earthen dam and explain with neat sketches
2	Explain the method of checking the stability of earth dam foundation against shear failure
3	In order to find factor of safety of downstream, slope during steady seepage, the section of the dam was drawn to scale 1 cm = 4 m. The following results were obtained on a critical slipcircle. Area of N-rectangle = 14.4 sqcm Area of T-rectangle = 6.4 sqcm Area of U-rectangle = 4.9 sqcm Length of arc = 12.6 cm. Laboratory tests have furnished values 26^0 for effective angle of friction and 19.5 kN/m^2 for cohesion, unit weight of soil = 19 kN/m^3. Determine the factor of safety of the slope
4	A homogeneous earth dam 37 m high is built to store water for irrigation requirements with a free board of 2 m. A horizontal filter of 31 m length is provided as its downstream end. The coefficient of permeability of the dam material is 2 x 10^3 cm/sec. Aflownetwasconstructedthroughthebodyofthedamgivingfollowingresults. Number of potential drops = 27, Number of flow channels = 4, Calculate the seepage flow per meter length of a dam in liters per second.
5	What are the criteria for the safe design of earth dam? Enlist and discuss the criteria for safe design of earth dam. Enlist different methods of construction of earthen dam and explain the design criterions of earthen dam?
6	Explain Swedish slip circle method of analyzing the stability of an earthen dam slopes.
7	What are 'rock fill dams' and what are their advantages over earthen dam? Draw a near sketch showing the cross section of a rock fill dam.
8	Enumerate and explain by neat sketch, the different ways the earth dam may fail. Also suggest suitable precautions that should be taken to avoid each type of failure.
9	Write short note on:i) Rock toe ii) Design of drainage filters for earthen dam.
10	What precautions and remedial measures would you undertake to control the 'seepage' through earthen dam body and through the dam foundation
11	What are the precautions that would you take while constructing an earth dam? Explain the Swedish slip circle method of analyzing the stability of an earth dam slopes. With neat sketch derive an expression of factor of safety against sliding for earthen embankment by Swedish slip circle method.
12	Explain how the following parameters affect design of an earthdam: i. Optimum moisturecontentII. C and ϕ values of soil; permeability ofsoil. III. Sudden draw-down of the reservoir
13	For a homogeneous earth dam 62 m high and 2 m free board, a flow net was constructed and following results were obtained. Number of potential drops = 35, Number of flow channels = 4. The dam has horizontal filter of 40 m length at its downstream end. Calculate the seepage discharge per meter length of the dam. Assume coefficient of permeability of the dam material as $3x10^{-3}$ cm/sec.
14	What precautions and remedial measures would you undertake to control the 'Seepage' through earthen dam body and through the dam foundation?
15	Draw a typical cross section of a zoned embankment type earth dam of 50 m height indicating the various components of the dam. Discuss the significance of important components.

Draw a cross section of a 'Zoned Embankment type Earth Dam' and discuss the significance of each component.

16 A homogeneous earth dam 43m high is built to store water for irrigation requirements with a free board of 2m. A horizontal filter of 29m length is provided at its downstream end. The coefficient of permeability of the dam material is $2X10^3$ cm/sec. A flow net was constructed through the body of giving following results. Number of potential drop= 25; No of flow channels= 4. Calculate seepage flow per meter length of dam in liter/sec.

17 For homogeneous earth dam 62m high and 2m freeboard, a flow net was constructed and following results were obtained. No of potential drops= 26; No of flow channel= 5. The dam has horizontal filter of 50m length at its downstream end . Calculate seepage discharge per meter length of a dam. Assume coefficient of permeability of earth dam material as $3X10^3$ cm/sec.

18 A flow net is plotted for homogenous earthen dam of height 29 m and free board 2 m. the results obtained are. Number of potential drops = 10, number of flow channels = 4. The dam has horizontal drainage filter of 30m length at the downstream end and the coefficient of permeability of the dam material is 15x10^-4 cm/sec. calculate the discharge per meter run of the dam.

19 An earthen dam made of homogeneous material has the following data:Level of the top of dam = 200m, level of deepest river bed = 179m, H.F.L of reservoir = 197.5m, width of top of dam = 4.5m, upstream slope = 2:1, length of horizontal filter from d/s toe, inwards = 25m, cohesion of soil of dam = 24kN/m3, cohesion of soil of foundation = 54kN/m2, angle of internal friction of soil in the dam = 25^0, angle of internal friction of soil in foundation =12^0, dry weight of soil in dam = 19 kN/m3, submerged weight of soil in the Dam = 12 kN/m3, Dry unit weight of foundation soil =19.3 kN/m3, coefficient of permeability of soil in the dam = 6x10^-6 m/sec.
The foundation soil consists of 8 m thick layer of clay, having negligible coefficient of permeability. Check the stability of the dam and its foundations.

20 What are 'rock fill dams' and what are their advantages over earthen dam? Draw a neat sketch showing the cross section of a rock fill dam.

21 A flow net is plotted for a homogeneous earthen dam of height 29.0 m and free board 4.0 m. The results obtained are number of potential drops 10, number of flow channels 4. The dam had horizontal drainage filter of 29 m length at the downstream end. The coefficient of permeability is 6 × 10–4 cm/sec. Calculates the discharge per meter run of dam.

22 Write short note on : 1) Dam instrumentation

Unit: 4: Spillway and Outlets

Q. No.	**Statement**
1	What are the different types of spillways? How are they selected for individual conditions? Discuss with neat sketches.
2	Discuss U.S.B.R recommended stilling basins II and IV with suitable sketch.
3	Enlist different types spillway gates and explain Radial and vertical lift gate with neat sketches

4 Design a suitable section for the overflow portion of a concrete gravity dam having the downstream face sloping at a slope of 0.7 H: 1 V. the design discharge for spillway is 8000 cumecs. The height of the spillway crest is kept at RL 205 m. the average river bed level at the site is 100 m. the spillway length consists of 6 spans having a clear width of 16 m each. Thickness of each pier may be taken as 2.7m.

5 What do you mean by dam sluice? Why such sluice arenecessary in dam construction?

6 Write a short note on with suitable sketches: River intake and Trash racks

7 What do you mean by outlet works? How do you classify outlet works? Which are the major components of the outlet works.

8 Show with a neat sketch, provision of a sluiceway in an earth dam

9 Asiphonspillwayhadthefollowingcrosssectionatitsthroat.Heightofthethroat = 1.6 m. Width of throat = 5 m. At the design flow, the tail water elevations is 2 m above the summit. Taking a coefficient of discharge as 0.7, determine the capacity of thesiphon, Determine the head that would be required on an ogee spillway 3.9 m long to discharge this flow, if coefficient of discharge is 2.5. What length of the ogee weir would be required to discharge the same flow with a head of 2.3 m on the crest?

10 Draw a neat labelled sketch of 'Wet Intake Tower' and describe itsworking.

11 What is meant by energy dissipater? Discuss the various methods used for energy dissipation below spillways.

12 Enumerate important types of spillway gates. Describe with a neat sketch the construction and working of 'Radial Gate'. **OR**
Enumerate important types of spillway gates. Describe with a neat sketch the construction and working of 'Tainter Gate' **OR**
Explain with help of a sketch, the components and working of a Trainer (Radial) dam gate. OR
Enumerate important types of spillway gates. Describe with a neat sketch the construction and working of 'Radial Gate'

13 A saddle siphon spillway has the following data. Full reservoir level = 495 m, Level of centre of siphon outlet = 489.6 m, Highest flood level = 485.9 m, Highestflood discharge = 580 cumec. If the dimensions of the throat of the siphon are: width = 5.2 m and height = 2.9 m, determine the number of siphon units required to pass the flood safely. The siphon is to discharge freely in air. Assume coefficient of discharge = 0.75.

14 What is meant by a 'Dam sluice'? Why are such sluices necessary in dam construction?

15 Write down an equation for calculating the discharging capacity of an ogee spillway. How does the 'coefficient of discharge' in this equation various withthe:
   i. depth ofapproach
   ii. slope of upstream face of the ogeespillway
   iii. submergence of the spillway by the tail water

16 Discuss briefly the design principles that are involved in the design of an ogee spillways.

17 Determine the discharge over a Chute spillway with 'Ogee Crest' using the following data: Length of spillway is 240 m, Height of spillway crest in front of at upstream approach channels is 10 m. Width of approach channel is 240 m and depth of water over spillway crest is 7 m.

18 What are different kinds of spillways and how are they selected for individual conditions?

19 Siphon spillway of rectangular cross section had the following dimensions at its throat. Height of throat = 1.9 m. Width of throat = 7 m. At the design flow, the tail water elevation is 10 m below the summit of the siphon and head water elevation is 5 m above the summit. Taking coefficient of discharge as 0.7, determine the discharge capacity of the siphon. Also determine the head that would be required on an ogee spillway 3.8 m long to discharge this flow if coefficient of discharge is 3.25.

20 Compute the discharge over an ogee weir with coefficient of discharge equal to 3.4 and head of 2 m. The length of spillway is 100 m. Weir crest is 8 m above the bottom of approach channel having same width as that of spillway.

21 What is meant by energy dissipater? Discuss the various methods used for energy dissipation below spillways.

22 Write short note on : 2) Jump height and tail water rating curve

23 Distinguish between ogee and side channel spillway.

Unit 5; Weirs on Permeable foundations

Q. No.	**Statement**
1	Briefly explain the salient features of Khosla's theory and how it is used in the design of permeable foundations? How does Lane's theory differ from Bligh's creep theory?
2	Briefly outline Khosla's theory on the design of weirs on permeable foundation. Enumerate the various corrections that are needed in the application of this theory. Write a short note on Khosla's theory and his concept of flow net for seepage flow below the foundation of weirs on permeable foundations?
3	State the fundamental difference between Khosla's theory and Bligh's creep theory for seepage below a weir. OR State the fundamental difference between Khosla's theory and Bligh's creep theory for seepage below a weir. OR State the fundamental difference between Khosla's theory and Bligh's creep theory for seepage below a weir
4	What are the main causes of failures of weirs on permeable foundations, and what remedies would you suggest to prevent them? OR Discuss briefly the causes of failure of hydraulic structures, founded on previous foundations.
5	What is meant by 'piping' in a hydraulic structure? What are ill effects of piping? What are the precautionary methods to avoid the ill effect of piping?
6	Write a short note on Bligh's creep theory for seepage flow under the weirs on permeable foundations?
7	What are Kolhapur type weirs? Describe the operation policy of KT weirs over the water year

Unit 6; Canal Cross Drainage works

Q. No.	Statement
1	Name the various types of canals which are required to be constructed while planning a canal irrigation system. OR Explain discuss different type or alignments of irrigation canals suitable for particular topography & the command area. Give an account of the investigations and surveys required while planning an irrigation canal project in a given tract of land. Discuss the factors governing the selection of alignment of the main canal and its branches
2	What are the possible water losses in canal? What are the methods adopted for reducing such losses?
3	Write short notes on: Canal siphon Write short notes on: Level crossing What are the different types are of cross drainage works that are necessary on canal alignment? State briefly the conditions under which each one is used. OR What are the different types are of cross drainage works that are necessary on a canal alignment? State briefly the conditions under which each one isused. OR Discuss the various types of cross drainage works used in canal systems. What considerations govern the selection of the different types ofworks? **OR** State under what circumstances you will recommend the use of following cross drainage work (i) Syphon (ii) Aquaduct**OR** Explain following CD works with neat sketches (i)Aquaduct (ii) Level crossing What are the different types of cross drainage works? Explain them with neat sketches
4	Enumerate different canal lining materials. Also discuss the design & construction of cement concrete lining.**OR** Enumerate different lining material & discuss the factors which are responsible for selecting particular material in a particular project? OR What is meant by canal lining? Why it is essential? Enumerate different liningmaterials and discuss the characteristics of good lining material.
5	How will you justify economically the necessity of lining an existing canal? What added benefits you will expect if the canal to be lined is how and yet to be constructed? Write detailed note on 'Financial justification for lining newcanal'.

Unit: 7; River Training and Drainage

Q. No.	Statement
1	What are the two principal types of drainage systems, necessary for draining irrigated tracts to avoid their water logging? OR Discuss different types of drainage systems provided in irrigated tracts as precautions against water logging. Give salient features of an open drain system. What are the different types of drainage systems provided in irrigation tracts as precautions against water logging? Explain them with neat sketches.

2 Write short note on high water, low water and mean water rivert raining.

3 Explain how do the following assist in river control:
   i. Spurs
   ii. Revetment
   iii. Guide bunds

Explain how do the following river training structures assist in river control

4 Write short note on the following:
   i. High water, low water and mean water training.
   ii. Use of levees for protecting cities from floods. OR

Write short notes on:
   i. High water, low water and mean water training.
   ii. Groynes, their types of uses

What is meant by high, low and medium river training works?

5 What is meant by water logging? What are its ill effects? Describe some anti-logging measures with suitable sketches.

6 Write short note on:
   i. Importance of rivers and necessity of controlling them.
   ii. Aggrading and degrading rivers.

7 What is meant by water logging? What are its ill effects? Describe some anti-water logging measures with suitable sketches.

8 Write short notes on the following river training works.
   i. Levees.
   ii. Repellinggroynes

9 What are saline lands? How will you proceed to reclamation salinelands?
What is meant by 'saline' and 'alkaline' soils? What precautions will you adopt to prevent salinity of irrigated land?

10 What is meant by water logging? What are its ill effects? Describe some anti-water-logging measures with suitable sketches.
What are the principal causes of water logging in a canal irrigated tract?

11 Explain with neat sketches the different types of 'spurs' which are commonly used for controlling and training Indian rivers?

12 What is meant by 'river training' and what are the different objectives served by it?
What is mean by river training? What are the objectives served by it? Enumerate different types of river training works with neat sketches.

13 What are the two principal types of drainage systems necessary for draining irrigated tracts to avoid their water-logging? Discuss in details.

Unit: 8; Hydropower

Q. No. **Statement**

1 A runoff river plant is installed on a river having a minimum flow 15 cumec. Head available at the plant is 16 m and the plant efficiency may be assumed as 80%. If the plant is used as a peak load plant operating for 6 hours daily, compute the firm capacity of the plant:

i. Withoutpondage

ii. With pondage but allowing 8% water to be lost in evaporation and otherlosses

2 Define and differentiate between the following in connection withhydropower:

i. Firm power and secondarypower

ii. Installed capacity and dependable capacity of a power house

Define and differentiate between the following in connection withhydropower:

i. Firm power and secondarypower
ii. Load factor and plant factor
iii. Installed capacity and dependable capacity of a power house

3 A runoff river plant has installed capacity of 19000 kW and it operates at 40% load factor when it serves as peak load station. What should be the minimum discharge in the stream so that it may serve as a peak load station? The plant efficiency may be assumed as 82% when working under a head of 45 m. Also calculate the maximum load factor of the plant when the discharge in the stream is 32 cumec

4 Classify the hydro-electric power schemes according to the available head. Draw a sketch to show a general layout of high head scheme.

5 A runoff river hydroelectric power station is proposed across a river at a site where a net head of 35 meter is available on the turbine. The river carries a sustained minimum flow of 45cumec in dry weather. Sufficient pondage is provided behind the power station to supply daily peak load of demand with a load factor of 75%. Assuming the plant efficiency of 70%, determine the maximum generating capacity of generators to be installed at the power house. If the daily load pattern indicates 19 hours average load and 5 hours peak load, determine the pondage to be provided to supply the daily demand.

6 A runoff river plant has installed capacity of 15000 kW and it operates at 30% load factor when it serves as peak load station. What should be the minimum discharge in the stream so that it may serve as a peak load station? Also calculate the maximum load factor of the plant when the discharge in the stream is 45 cumec. Assume plant efficiency as 70% and working head as 20 m.

7 How do you classify a hydro-electric scheme on the basis of its operating head?

8 FOUR turbo generators each of capacity 10000 kW have been installed at a hydel power station. During a certain period of load, the load on the power plant varies from 1200 MW to 26000 MW. Calculate

i. total installedcapacity

ii. loadfactor

iii. plantfactor and utilization factor

9 A runoff river plant on a stream has inflow of 30 cumec and head of 40 m with provision for pondage to meet daily peak demand with a load factor of 70%. Determine the power generation capacity at 90% overall efficiency. The plant runs as a peaking station for 3 hours and balance period in the day for average load. What volume of pondage is required?

10 Write a detailed note on the use and typesof ‘turbines’in a hydroelectric scheme.

11 A runoff river hydroelectric power station is proposed across a river at a site where a net head of 50 meter is available on the turbine. The river carries a sustained minimum flow of 70 cumec in dry weather. Sufficient pondage is provided to supply daily peak load of demand with a load factor of 71%. Assuming the plant efficiency to be 65%, determine the maximum generating capacity of generator to be installed at the power house. If the daily load pattern indicates 24 hours average load and 4 hours peak load, determine the pondage to be provided to supply the dailydemand

12 What are the principal components of a hydro-electric scheme? Discuss the utility of each component.

13 A runoff stream station with installed capacity of 19000 kW operates at 19% load factor when it serves as peak loadstation.

i. What should be the lowest discharge in the stream so that station may serve as a base peak load station? It is given that plant efficiency as 77% when working under 50 mhead.
ii. Calculate the maximum load factor of the plant when the discharge in the stream rises to 40 cumec

14 What are the typical components of hydropower plant? Draw a layout of medium head hydropower plant.

15 Write a short note on selection of suitable type of turbine for a hydroelectric scheme.

16 What are the typical components of the hydro-electrical scheme? Discuss the utility of each component.

17 Define & differentiate between
(i) Firm & secondary power
(ii) Load factor & plant factor
(iii) Installed capacity & dependable capacity of a power house

18 Discuss the following terms in connection with a power plant:
i. Firm power ii.Loadfactor iii. Utilizationfactor

19 A runoff river plant with an installed capacity of 17000 kW operates at 38% load factor when it serves as peak loadstation.

i. What should be the lowest discharge in the stream so that station may serve as a base peak load station? The plant efficiency may be assumed to be 80% when working under head of 30m.
ii. Also calculate the maximum load factor of the plant when the discharge in the stream rises to 39 cumec

20 A runoff river plant is installed on a river having a minimum flow 16 cumec. Head available at the plant is 16 m and the plant efficiency may be assumed as 90%. If the plant is used as a peak load plant operating for 6 hours daily, compute the firm capacity of the plant:

i. Withoutpondage
ii. With pondage but allowing 8% water to be lost in evaporation and otherlosses

21 Enlist different types of hydropower plant and discuss their suitability according to the site and hydrological conditions. Draw a neat sketch of Storage Type Hydropower plant and label the components.

22 A runoff river plant has installed capacity of 1600KW & it operates at 40% load factor when it servers as peak load station. What should be minimum discharge in the stream so that it may serve as peak load station? The plant efficiency may be assumed as 92%.when working under a head of 35m. Also calculate max. Load factor of the plant when discharge in stream is 32m/s.

23 Three turbo generators each of capacity 5000 kw have been installed at a hydro power

station. During a certain period of load , the load on the plant varies from 1400kw to 2700kw.Calculate

(i) Total installed capacity, Load factor

(ii) Plant factor &Utilization factor.

24 Give the detailed classification of hydroelectric power plants.

25 Three generators each of capacity 8000 kW have been installed at a power station.During a certain period of load, the load on the plant varies from 15000 kW to 25000 kW.

Determine :

1) Total installed capacity2) Load factor3) Plant factor4) Utilization factor

26 A runoff river plant has installed capacity of 1500KW & it operates at 42% load factor when it servers as peak load station. What should be minimum discharge in the stream so that it may serve as peak load station? The plant efficiency may be assumed as 85%.when working under a head of 29m. Also calculate max. Load factor of the plant when discharge in stream is 40 m^3/s.

27 Distinguish clearly between run-off river Hydropower plants and storage type hydropower plants.

T.Y BTech Examination APRIL/MAY-2022
Course Name : Electrical Engineering
SemesterVI
Subject: ELECTRICAL SAFETY

CBCS (w.e.f. - 2018)
Class: TY Electrical

Name of Faculty : Prof .P.B Vyavahare

Question Bank

Q. Eight marks question

1.ExplainObjective of safety management
2. State procedure of "work permit" at site to do work on electrical plant
3.State and explain safetyequipment
4. State adquet clearances to be provides between phases, and phase to earth
5. State adquet clearances to be provides betweenwork section and live part , isolating distance
6.State and explain Primary shocks & secondary shocks their occurrence
7.state and explain effect of electrical shocks on human body
8.state and explain safety precautions against electric shocks
9.Staterecommendations for preventing electric shocks
10. Explain Removal of contact with live conductor
11. State and explain methods of artificial respirations
12.state and explain safety procedures during erection phase
13.state and explain safety procedures during commissioning phase
14. state and explain safety proceduresduring operation
15. state and explain safety proceduresduringmaintenance phase
16.stateCause of different type of electric fires
17.how do deal with fire on electrical installations
18.stateactions to be taken in case of fire
19.stateactions to be taken in case of prevention of electric fires
20. State and explain types of extinguishers used.
21. What is electrical shock? Distinguish between primary shock and secondary shock
22. state seven principles of safety management
23.State safety chain in details
24.Explain design of plant earthing system with reference to touch potential and step potential
25.Explain medical analysis of electrical shock
26.Explain the steps of first aid at site when person get electrical shock
27.Explain in details Nielson arm lift back pressure method for artificial respiration
28. Explain in details Schafer prone pressure method for artificial respiration
29. Explain in details Sivesters method for artificial respiration
30. Explain in details mouth to mouth method for artificial respiration
31.state objectives of commissioning related safety
32.State essential of commissioning of safety
33.Explain importance of earthing

34 Explain types of earthing in details
35. Explain primary shock in details
36. Explain secondary shock in details
37. State safety procedure in electrical plant
38. Explain safety management system
39. Explain safety in line function in organization with matrix responsibility
40 .State causes of electrical accident

Civil Engineering

Third Year Part II (Semester VI)

Self Learning Module-II (Technical) Subject: TQM and MIS in Civil Engineering. (B Tech III Sem VI) (w.e.f.Nov.2020)

1. What is Total Quality Management (TQM)? Give the Basic Concepts of TQM?
2. What are the Dimensions of Quality? Explain Deming Philosophy
3. What are the Principles of TQM?? Explain in brief
4. Write a note on function of 'Total Quality Management".
5. What a note on Objective 'Total Quality Management"? Mention its benefits
6. What are the various quality statements of TQM? Explain in brief.
7. What is "Quality Circle"? Explain the objective and function of "Quality Circle".
8. What are the steps in the PDSA cycle? Explain in brief each step.
9. What is Kaizen? Explain the basic objective and function of Kaizen in brief.
10. What are the phases of a Continuous Process Improvement Cycle?
11. Define 5S? Explain in brief about each "S".
12. What is "Statistical Quality Control"? Explain the various quality control chart used for quality assurance
13. What are the types of Control Chart? Explain each chart with graph presentation.
14. Define Six Sigma Problem Solving Method?
15. Define FMEA? What are the stages of FMEA?
16. Give the ISO 9000 Series of Standards? Explain in brief need for ISO 9000?
17. What are the various histogram shapes? Explain with sketch.
18. Explain the three components of the Juran Trilogy?
19. Enlist the seven tools of quality? Explain in brief.
20. Define Benchmarking. What are the types of benchmarking?
21. What is Management Information System? Explain in brief use of MIS in any sector.
22. Explain various types of Information.
23. Why MIS is having high need of management today?
24. Explain the concept of Decision Making. Describe Herbert Simon's model of Decision-making.
25. Distinguish between MIS & DSS
26. Define ES. Explain its components with a diagram.
27. Define EIS. Explain its characteristics

Civil Engineering

Third Year Part II (Semester VI)

Self Learning Module-II (Technical) Subject: TQM and MIS in Civil Engineering. (B Tech III Sem VI) (w.e.f.Nov.2020)

28. Define and compare MIS and EIS. Explain the internal and external factors necessitating EIS.
29. Define ESS. How ESS is supportive of MIS in any organization? Explain in brief
30. Explain in brief the Software and Hardware section of MIS?
31. Write a note on Data processing.
32. Write a note on Information processing.
33. Write a brief note on “Use of MIS in engineering sector”.
34. Write a note on use of “Computer system in Civil engineering sector”.
35. Write a advantage and limitation of MIS.

T.Y. B.Tech. (Electronics & Tele Communication Engg.) (Part-I)

(w.e.f. June 2020-21)(CBCS)

BUSINESS ETHICS

Question Bank

Q1. Explain Globalization is a key context for Business Ethics

Q2. Explain Ethical impacts of Globalization

Q3. Explain Sustainability is a key goal for Business Ethics

Q4.Explain in detail three components of sustainability

Q5.Explain the role of ethical theory

Q6. What are normative ethical theories?

Q7.Explain Traditional ethical theories

Q8.Explain utilitarianism

Q9.What are the stages in ethical decision making

Q10. What are the influences on ethical decision making?

Q11.Explain Framework for understanding ethical decision making

Q12.What are the limitations of ethical decision making model

Q13.Explain National and Cultural Characteristics

Q14.What is cognitive moral development

Q15.What are the different stages of Cognitive Moral Development

Q16.What is meant by Personal values, integrity and moral imagination

Q17. What is Business Ethics Management?

Q18.Explain different tools and techniques of ethics management

Q19.What is the role of various agencies in ensuring ethics in the corporation?

Q20.Explain typical components of business ethics management

Q21.Explain evolution of business ethics management

Q22.Explain in detail Codes of Ethics

Q23.Explain prevalence of the codes of ethics

Q24.What are Critiques of ethical codes

Q25.Explain Effectiveness codes of ethics

Q26. Explain Global Codes of ethics

Q27.Explain different types of stakeholder relationship

Q28.What are Different problems with stakeholder collaboration

Q29. Explain different areas of assessment

Q30.Define Social Accounting

Q31. Why do organizations enter into social accounting ?

Q32. What makes for good social accounting?

Q33. Explain rational model of the organization

Q34.What are necessary conditions for a conflict of interest to arise

Q35.Explain Organizational politics

Q36.What are characteristics of the caring model of organization

Q38.Explain consumers as stakeholder

Q39.Explain moral duty to consumer under contractual theory

Q40.Explain Due Care Theory of firm's duties to customer

Q41.What is the problems with due care theory

Q42.Explain ethical issues in market research

Q43.Expain Characteristics of Advertising

Q44. Explain Charity and Community involvement

Q45.Explain the ethics of pollution control

Class: TY B.Tech (Electronics Engineering) Part I **Sub.: Electronics System Design**

Question Bank

Section _I

Questions for 4 marks (Q.2)

1. Classify and compare electronics product.
2. Implement data acquisition system for the microcontroller based temperature control using RTD.
3. State and explain various stages/phases of hardware design in electronics product development.
4. What are the various electronics product requirements?
5. Draw and explain basic block diagram of 4-channel data acquisition system.
6. Explain different constructs of regular program.
7. State and explain various stages/phases of software design.
8. Explain recommended steps to be followed in a software development in real life microprocessor based product design.
9. What are the goals of software design?
10. How simulator can be used in software design and product development?
11. Draw and explain software structure diagram for data acquisition system.
12. Develop the one page brochure for any suitable electronic product.
13. Develop the one page user manual for any suitable electronic product.
14. Explain product development cycles.
15. What are the expectations from the user for electronic consumable product.
16. Define battery management System and explain it in detail.
17. PT100 interfacing circuit
18. Working of thermocouple
19. Types of thermocouple
20. Types of batteries
21. Comparison of batteries
22. Working of LDR
23. Interfacing of LDR
24. Working of DHT11
25. Interfacing of DHT11

Questions for 6 marks (Q.3)

1. Working of LM35
2. Temperature measurement system using LM35
3. Interfacing of LLM35

4. Various phases in software design.
5. Program Constructs
6. Design of single cell Li-ion battery Charger
7. Design of single cell Li-ion battery Charger with temperature compensation
8. Design of single cell Ni-MH battery Charger
9. Design of single cell NI-MH battery Charger with temperature compensation
10. Signal conditioning circuit for PT100
11. Interfacing of PT100
12. Temperature measurement using PT100
13. Temperature measurement using thermocouple
14. Data acquisition system for PT100
15. Components of battery management system

Sectrion_II

Questions for 4 marks (Q.4)

1. PCB design rules for digital circuits.
2. PCB design rules for analog circuits.
3. Layout rules in PCB design.
4. Block diagram of Smart Card Systems.
5. Signal in RS485 serial protocol.
6. Memory mapped IO
7. IO mapped IO
8. Compare memory mapped IO and IO mapped IO
9. The various steps to be followed in PCB design.
10. The meaning of RS232 signals
11. Interfacing of RS232
12. Interfacing of RS485
13. Note on Graphical LCD
14. Hardware components of Digital Camera.
15. Software components of Digital Camera.
16. Working of touch sensor
17. Temperature controller system
18. Pressure controller
19. Block diagram of attendance monitoring system
20. Types of PCB
21. Note on Noise due to ground and supply line in PCB design
22. Note on Grounds, returns in PCB design
23. Note on Shields in PCB design
24. Microcontroller interfacing techniques

Questions for 6 marks (Q.5)

1. Hardware and software components of simple digital camera.
2. Design requirements which need to be considered in PCB design.
3. Interfacing of the touch sensor TTP223B
4. Develop the system for RFID based attendance monitoring system.
5. Interconnection parameters Resistance
6. Interconnection parameters Capacitance
7. Design of temperature controller
8. Interfacing of Graphical LCD
9. Interfacing of touch sensor
10. Comparison between RS232 and RS485
11. Development of digital camera
12. Development of smart card system
13. Important terms in PCB design
14. PCB design elements
15. Interconnection parameters- Inductance in PCB design

Department of Electronics Engineering
T.Y. (Electronics) Part I
Question Bank

Sub.: Microcontrollers

UNIT 1 : Fundamentals of Microprocessor

1) List the three buses found in computer systems and state briefly the purpose of each bus.
2) What is the purpose of program counter, stack pointer and instruction decoder?
3) How computer is internally organized and works?
4) How memory is organized?
5) Compare the memories RAM, SRAM, and DRAM.
6) Compare the memories ROM, PROM, and EPROM, EEPROM and Flash memory.
7) Compare microprocessor and microcontroller.
8) What is timing diagram? Draw the timing diagram for memory read and memory write operation for microprocessor 8085.
9) If address and data pins are multiplexed, how to de-multiplex? What is need of this de-multiplexing ?
10) For any computer, data bus is bidirectional and address bus is unidirectional. Why?

UNIT 2 : The 8051 Architecture

1. Compare RISC and CISC architecture
2. List out the features of 8051.
3. What are the different registers and their purpose in 8051 microcontroller?
4. Define addressing mode. Explain the different addressing modes in 8051 with suitable example.
5. How PUSH, POP, XCH, XCHD, DJNZ instructions of 8051 works?
6. What are the bit manipulation instructions in 8051?
7. Write a program for finding even and odd numbers form a given array of 10 elements.
8. Write a program for finding a largest number form a given array of 10 elements.
9. Draw and explain memory organization in 8051.
10. Show the status of the CY, AC and P flag after the addition of 88H and 93H in the following instructions.

    MOV A, #88H
    ADD A, #93H
11. Write 8051 program to sort a given array in ascending order.
12. Compare LJMP, SJMP and AJMP

13. Write a program to add five BCD numbers stored from 50h. Store the BCD result from 60h.
14. A switch is connected to P1.7. Write a program to send FFh to P2 when switch is closed else send 00h to P2.
15. Why are the program counter (PC) and data pointer (DPTR) registers of 8051 16-bit wide, whereas the 8051 stack pointer register is 8-bit wide only? Justify.
16. What happens in the following instructions?
    a) Here: SJMP Here b) MOV SP, #74 c) JZ FEh
    d) JC 02 e) INC @R3 f) DEC 51h
    g) CPL 91h
17. When it is required to use the control signals WR and RD?
18. Differentiate MOV, MOVX, and MOVC instructions with examples.
19. Write a program to add respective elements of two arrays of ten elements.

UNIT 3: 8051 On-chip Peripherals

1. What are the functions of the following 8051 pins?
   ALE EA PSEN T0 RST TXD XTAL2
2. Draw and explain the bit format of PSW register in 8051.
3. List the interrupt sources in 8051. Write their causes, flag affected, and vector address.
4. How to enable/disable the interrupts in 8051? Explain with respective SFR.
5. How to change the default interrupt priority in 8051? Explain with respective SFR.
6. How RETI and RET instructions differ.
7. What is the difference between the operation of timer and counter in 8051?
8. Draw and explain the bit formats of TMOD and TCON registers.
9. What are the modes of operation of Timer in 8051.
10. Write an 8051 program to toggle pin P1.0 continuously every 250ms. Use Timer1, mode 1 to create the delay. Assume XTAL= 11.0592MHz.
11. Write an 8051 assembly and C program to generate a square wave of 50 Hz frequency on pin P2.3. Assume XTAL= 11.0592MHz. Use Timer interrupt.
12. Program Timer 0 to generate a square wave of 0.5 KHz.
13. Program Timer 1 to generate a square wave of 10 KHz.
14. How can an external frequency be measured using the 8051?
15. A switch is connected to pin P1.2. Write a C program to monitor the switch (SW) and create the following frequencies on pin P1.7:
    If SW=0 500 Hz else 750 Hz. Use Timer 0in mode 1 for both of them.
16. Program Timer 1 to be counter. Use mode 1 and display the binary count on Port 1 and Port 2 continuously.
17. Program Timer 1 to be counter. Use mode 2 and display the decimal count on P2, P1 continuously. Set the initial count to 99.
18. Draw the bit format of SCON register. Write the meaning of each bit.

19. Explain the different modes in serial interface of 8051.
20. What are the steps to be follow to program the 8051 to receive and transmit data serially.
21. Take data through ports 0, 1, and 2, one after other and transfer this data serially, continuously.
22. Write 8051 C program to transfer the message "YES" serially at 9600 baud, 8-bit data, 1 stop bit. Do this continuously.
23. How Port 0 structure in 8051 differs from Port 1, 2 and 3?
24. Write a program to make Port 2 toggle after o.5 second continuously.

UNIT 4

1. Draw and explain interfacing of 16*2 LCD to 8051. Write a program to display "HI" from second row-sixth column using busy flag.
2. Interface 4*4 keyboard to 8051. Explain it and write a program to read the value of key pressed.
3. Draw and explain interfacing of 16K x 8 Data RAM to 8051. Write a assembly program to read 100 bytes of data from P1 and save the data in external starting at RAM location 5000h.
4. Explain the MOVC A, @A+PC and MOVC A, @A+DPTR instruction with example.
5. Draw and explain interfacing of 8K x 8 Data ROM to 8051. Write a assembly program to read 30 bytes starting at 1000h in external ROM.
6. Draw and explain interfacing of 16K x 8 program ROM to 8051.
7. Draw and explain interfacing of ADC 0808/09 to 8051. Write a program to covert analog voltage on channel 1 to digital.
8. Draw and explain interfacing of a unipolar stepper motor to 8051 and write a program to rotate the stepper motor in clockwise direction continuously.
9. Write a program to rotate the stepper motor in anti clockwise direction continuously.
10. Write a program to rotate the stepper motor in clockwise direction for five rotations
11. Interface 8 LEDs to 8051 and write a program to turn on and off alternate LEDs continuously.
12. Interface one digit seven segment display to 8051 and write a program to display "0" to "9".
13. Interface two seven segment display to 8051 and write a program to display "00" to "99".
14. Draw and explain interfacing of DAC to 8051. Write a program
    i) To generate triangular wave
    ii) To generate a saw tooth wave

UNIT 5

1) List out the features of PIC16F877

2) How internal memory is organized in PIC 16F877?
3) What is the use of W, FSR, INDF, PCL, PCLATH registers in PIC?
4) How address of data is determined in different addressing modes in PIC 16F877?
5) How WDT and BOR internally operate?
6) Write PIC program to add two 16 bit numbers.
7) Write PIC program to clear memory location 20 h to 2F h with indirect addressing mode. Also write meaning of each used instructions.
8) What the following instruction does?
   1) BTFSS 2) DECFSZ 3) RETLW 4) IORWF
9) Draw and write the use of bits of STATUS register in PIC 16F877.
10) Draw PIC16F877 register file/internal memory map. What are the uses of partitioning into the banks and pages?
11) How do you use the PORT D as PSP? Explain the different control signals and flags used in PSP communication.

Unit 6

1) Describe functioning of CCP1 and CCP2 units for the capture mode.
2) Describe functioning of CCP1 and CCP2 units for the compare mode.
3) How do you operate CCP module in PWM mode? Explain PWM operation.
4) Draw and explain Timer0 module in PIC 16F877
5) How do you enable and disable the interrupts in PIC 16F877? Explain interrupt structure.
6) Write the steps to reading the EEPROM data memory in PIC and write a program for the same.
7) Explain I^2C operation in PIC microcontroller.
8) Explain Serial Peripheral Interface in PIC.
9) Write the steps to writing the EEPROM data memory in PIC and write a program for the same.
10) How do you configure the ADC in PIC 16F877? Explain its working.
11) Write a program to configure the internal ADC of PIC 16F877.
12) Explain Timer1 operation in PIC 16F877
13) What are the uses of Timer2 in PIC 16F877. Explain its operation.

B.Tech. (CSE)

Class: Final Year

Subject: BUSINESS INTELLIGENCE (Elective-III)

4 Marks Questions (Short Answer Questions)

1. Differentiate Data, Information and Knowledge with appropriate example.
2. Illustrate the components of Business Intelligence Architecture with neat diagram.
3. Define Business Intelligence. How BI helps to take effective and timely decisions?
4. Describe the cycle of BI Analysis with diagram.
5. What are the various steps involve in dimensional modeling? Describe with example.
6. Define Decision. Describe types of Decisions.
7. Compare ER modelling and dimensional modelling.
8. Describe and design snowflake schema for a suitable example.
9. Describe and design Galaxy schema for a suitable example.
10. Write short note on Metadata
11. Describe Enterprise Data Warehouse Architecture.
12. Compare dimension table and fact table.
13. Explain the classes of mathematical model.
14. What is the role of metadata in data warehouse? Describe with example.
15. Illustrate the Bivariate analysis and its types. Also elaborate Numerical-Numerical Bivariate analysis with appropriate example.
16. Describe the Data Mining process with neat diagram
17. Define Data validation. Illustrate the various techniques required to correct incomplete data in data validation.
18. Why there is a need of Data reduction?
19. What do you mean by data transformation?
20. The minimum and maximum profit is Rs. 15,000 and Rs. 1,50,000. Identify the profit in the range of (0,1) using min-max normalization for the value Rs. 40,000.
21. Elaborate various applications of Data Mining.
22. What are the motivation and objectives for the spread of relational marketing strategies?
23. Summaries the Taxonomy of web mining analyses.
24. Illustrate the purpose of Market basket analysis.
25. Describe an environment for Relational Marketing Analysis.
26. Describe classification tree with suitable example.
27. Write a short note on association rule mining.
28. Describe Bivariate analysis with suitable example.

29. What do you mean by measure of central tendency in data exploration?
30. Write a short note on clustering.

8 Marks Questions (Long Answer Questions)

1. Illustrate the structure of Mathematical models.
2. Define BI. Draw architecture of business intelligence system and explain its components.
3. Describe the phases of the decision-making process.
4. Design Dimension Models for "Web page clicking event" using Star constellation schema.
5. Illustrate the Phases in the development of mathematical models for decision making.
6. Describe the taxonomy of Decisions in DSS.
7. What is the purpose of Data Exploration? Describe three phases of Data Exploration.
8. Define Time Series. Describe the components of Time Series.
9. Describe Regression Analysis. List the types of Regression.
10. What is Time Series analysis? Describe its components. Design a Time Series using suitable example. Also identify the pattern.
11. Illustrate Exponential smoothing model.
12. Describe Linear Regression and types of linear regression.
13. Generate the association rule using Apriory algorithm. Take suitable dataset to generate rules.
14. Elaborate the classification tree with suitable example.
15. Summaries the Taxonomy of web mining analyses.
16. Define Clustering. List types of clustering method. Apply K-mean clustering algorithm to find clusters on given example.
    (Group the visitors to a website using just their age as follows: Dataset: 16, 16, 17, 20, 20, 21, 21, 22, 23, 29, 36, 41, 42, 43, 44, 45, 61, 62, 66)
17. Describe the Types of data feeding in a data mart for relational marketing analysis.
18. Describe the components of a relational marketing strategy.
19. Elaborate Bayesian method.
20. Explain Neural Network and its topologies in detail.

Theory Question

1. Explain the Piguad's theory for the analysis of slab panels. What are the limitations of this theory
2. What is economic span? How it is calculated? Derive the equation for the Same.
3. What are the basic components of bridge structure? Explain with the help of Sketch.
4. What is the importance of subsoil exploration in the design of major bridges? List the data to be obtained from such explorations
5. Give a critical review of IRC loading for bridges.
6. Enlist the factors affecting Selection of type of bridge
7. Explain various Types of bridges with their suitability
8. Discuss the fctors affecting location of piers and abutments.
9. What are the characteristics of an ideal site for a major bridge across a river
10. What is the significance of the impact factor and how it is estimated?
11. What are the requirements of bar sizes and spacing to ensure crack control in Concrete.
12. List three methods for load distribution among the longitudinal girders of a T beam bridge. Explain briefly any one
13. What are the basic components of bridge structure? Explain with the help of Sketch.
14. What is the importance of subsoil exploration in the design of major bridges?
15. List the data to be obtained from such explorations 16. Enlist the various loads to be considered for the analysis of bridges? Explain any one in detail
16. Write a note on Courbon's theory with its limitations

17. Explain the IRC class B loading for bridges. Write about it's suitability

18. Enlist the various Erection methods for bridges. Explain any one in detail

19. Describe Well foundation

20. Write a note on Expansion Joints

21. Explain various Types of Bearing

22. What is Reinforced earth retaining wall? Discuss the principle of RE wall

23. Enlist Types of bridge pier. Also discuss their suitability

24. Enlist the Functions of bearing

25. What is Approach slab? Explain in detail

26. Explain the various types bridge inspection with their importance

27. Explain Cantilever method of construction

28. Explain various types of Bridge Foundation with their suitability.

29. Enlist the forces acting on Pier.

30. What is the requirement of Elastomeric Rubber Pad? Explain in detail.

Problems -

1. Find the design bending moment of Two lane bridge solid deck slab for following data:
   a) Effective span- 6.5 m
   b) Carriage way width – 9 m
   c) Kerb- 600 x 275 on both side
   d) Live load- IRC Class A (Two lane)
   e) Wearing coat – 100 mm thick
   f) Use M-30 concrete and Fe- 415 steel
   g) Use $\alpha = 2.77$

   Find the percentage change in the design bending moment if the Live load of IRC class AA tacked is used.

2. A RCC T beam type bridge having deck slab of 220 mm thick, wearing coat of 80 mm thick, three longitudinal girders and five cross girders. Determine the Design bending moment for all the longitudinal girders. Use following additional data,
   a) Carriage way width -9 m
   b) Span of bridge – 16 m
   c) Live Load – IRC class AA Tracked
   d) Kerb- 600 mm wide, 400 mm deep
   e) Web thickness for Longitudinal and cross girder- 300 mm
   f) Longitudinal Girder spacing – 300 mm
   g) Use M-30 concrete and Fe -415 steel

   Find the percentage change in the design bending moments if four longitudinal girders are provided with spacing of 230 mm.

3. A RCC T beam type bridge having deck slab of 220 mm thick, wearing coat of 80 mm thick, three longitudinal girders and five cross girders. Design longitudinal girders for following additional data,
   a) Carriage way width -9 m
   b) Span of bridge – 18 m
   c) Live Load – IRC class A Two Lane
   d) Kerb- 600 mm wide, 400 mm deep
   e) Web thickness for Longitudinal and cross girder- 300 mm
   f) Longitudinal Girder spacing – 3.0 m

   Use M-30 concrete and Fe -415 steel

4. Design a slab panel of 'T' beam bridge for following data :
   1) Panel dimension 3.0 x 3.5 m
   2) Live load – IRC Class AA tracked
   3) Thickness of slab panel = 0.23m
   4) Thickness of wearing coat = 0.1 m
   5) For $\frac{U}{B} = 1$, $\frac{V}{L} = 1$ and $\frac{B}{L} = 0.8$, $m_1 = 0.35$, $m_2 = 0.030$
   6) For $\frac{U}{B} = 0.35$, $\frac{V}{L} = 1$ and $\frac{B}{L} = 0.8$, $m_1 = 0.085$, $m_2 = 0.060$

5. Design a solid deck slab for Two lane bridge with following data:
   a) Effective span- 7.5 m
   b) Carriage way width – 9 m
   c) Kerb- 600 x 280 on both side
   d) Live load- IRC Class A (Two lane)
   e) Wearing coat – 100 mm thick
   f) Use M-30 concrete and Fe- 415 steel

   Use $\alpha = 2.64$

6. Design a solid deck slab for Two lane bridge for following data:

   a) Effective span- 8 m (9)

   b) Carriage way width – 9 m

   c) Kerb- 600 x 275 on both side

   d) Live load- IRC Class AA tracked

   e) Wearing coat – 100 mm thick

   f) Use M-25 concrete and Fe- 415 steel

   g) Use $\alpha = 2.74$

7. Verify the adequacy of pier for the following data:
   Top width of pier- 1.7 m, Height of pier upto springing level -6 m, C/C distance of bearing- 1.2 m, Side batter 1:12 , HFL – 1.5 m below the bearing level, Span of bridge -10 m, Reaction due to D.L. from each span =2200 kN, Reaction due to L.L. from each span = 700 kN , Material of pier = M20 concrete

8. Design a elastomeric unreinforced bearing pad for following data
   Vertical load (sustained) = 196 kN,
   Vertical load (dynamic) = 46 kN,
   Horizontal force =56 kN
   Modulus of rigidity of elastomer- 1.1 N/mm^2
   coefficient of friction = 0.3

9. Verify the adequacy of pier for the following data:
   Top width of pier- 1.8 m, Height of pier upto springing level -10 m, C/C distance of bearing- 1.2 m, Side batter 1:14 , HFL – 1.5 m below the bearing level, Span of bridge -14 m, Self weight of the superstructure =250 kN/m , Live load- IRC class AA tracked, Material of pier = M20 concrete

10. Verify the suitability of abutment as shown in the fig 7.1 Use following data
    Density of soil – 18 kN/m^3, Friction angle of soil (Ø) = 30°.
    Coefficient of friction – 0.6, Live load IRC class AA tracked.

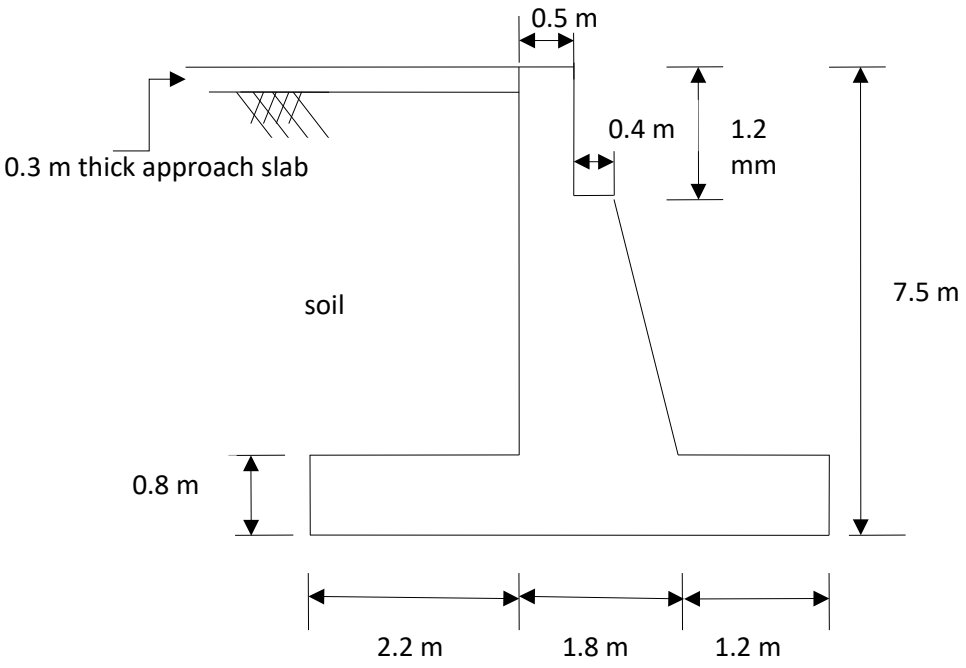


Fig no 7.1

11. Design a elastomeric unreinforced bearing pad for following data
    Vertical load (sustained) = 195 kN,
    Vertical load (dynamic) = 100 kN,
    Horizontal force = 95 kN
    Modulus of rigidity of elastomer- 1 N/mm^2
    coefficient of friction = 0.35

12. Verify the suitability of abutment as shown in the fig 7.1. Use following data
    Density of soil – 17 kN/m^3, Friction angle of soil (Ø) = 31°.
    Coefficient of friction – 0.5, Live load IRC class AA tracked.

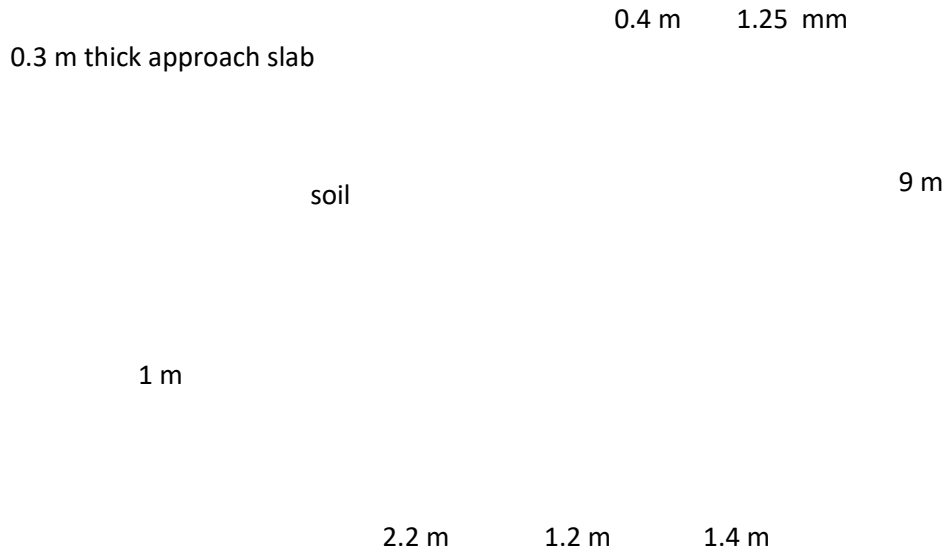


Fig no 7.1

13. Design a elastomeric unreinforced bearing pad for following data
    Vertical load (sustained) = 170 kN,
    Vertical load (dynamic) = 50 kN,
    Horizontal force = 90 kN
    Modulus of rigidity of elastomer- 1.1 N/mm^2
    coefficient of friction = 0.4

Class: Final Year B. Tech. (CSE) Sem-II (New w.e.f. Nov. 2021)

Subject: Elective-IV (Big Data Analytics) **Marks:70**

QUESTION BANK

1. What are the issues with the unstructured data?
2. How to deal with the unstructured data?
3. Classify the given data with Structured, Unstructured and Semi structured Data
4. What is Big data? What are the sources of Big Data?
5. State the characteristics of Big Data.
6. What are differences between traditional BI & Big Data?
7. Explain with diagram Big Data Technology Stack.
8. What is Big Data Analytics? Explain
9. Compare Analytics 1.0,2.0 and 3.0
10. Distinguish the features of Hadoop 1.0 and Hadoop 2.x and Describe with YARN architecture.
11. What is Data Science?
12. Explain the process of Data Science
13. What are the responsibilities of Data Scientist?
14. What are the advantages of In-memory data analytics and In-database processing?
15. What is the difference between parallel systems and distributed systems?
16. Distinguish between SMP & MPP.
17. What are NoSQL databases? Explain different types of NoSQL databases.
18. What are the advantages of NoSQL Databases
19. What is CAP Theorem or Brewer's Theorem? Explain its importance along with its databases
20. Explain different components of Hadoop ecosystem.
21. Illustrate with example, how MapReduce works.
22. Distinguish between RBBMS and NoSQL and New SQL.
23. What are the different types of Digital data? Mention various sources of digital data.
24. With diagram, explain the application workflow in hadoop YARN.
25. What are the functions of Application and Global resource manager in Hadoop
26. What are functions of HDFS daemons: Namenode, datanode and secondary name node?
27. With diagram. Illustrate the anatomy of File Read and File write operation in hadoop
28. What are the features of MongoDB?
29. Demonstrate the MongoDB CRUD operations with query examples
30. Explain how to import data from CSV file to Mongo DB collection with example.
31. What are the replication strategies used in Cassandra?
32. Demonstrate with example CRUD operations in Cassandra.
33. Illustrate Import & Export operations with example in Cassandra.
34. How writes are treated in Cassandra? Elaborate tunable consistency in Cassandra.
35. Explain the components of HIVE architecture.
36. With Diagram, illustrate the working of HIVE.

37. What is partitioning & bucketing in HIVE? What are its advantages?
38. How to create partitions and buckets using Hive query language?
39. What is Static and Dynamic partitioning in HIVE?
40. Write a HIVE function to convert the values of a field to uppercase using UDFs?
41. List four important features of Pig.
42. Explain the anatomy of Pig
43. List the advantages and limitations of Pig.
44. What is Pig Latin? Explain the ETL processing with Pig.
45. Illustrate LOAD & STORE operators in Pig with example.
46. Illustrate Grouping & Joining operations in Pig with example.

Final year B.Tech (E&TC)(sem-II) wef 2021-22

Sub: Microwave Engineering

Question Bank

1) State and explain similarities and dissimilarities between transmission line and waveguide.

2) State advantages, disadvantages and applications of microwave frequency band

3) Define mode in Rectangular waveguide. State different modes exist in rectangular waveguide. Which is dominant mode?

4) Draw the construction of E plane Tee and explain in brief working of E plane Tee. Why it is called as E plane Tee.

5) Draw the construction of H plane Tee and explain in brief working of H plane Tee.

6) Draw the construction of two hole directional coupler and explain in brief working of directional coupler.

7) What is Faraday rotation principle? State microwave devices which make use of faraday

Rotation. Explain any one in detail.

8) Explain in detail about construction details of Isolator.

9) Why microstrip line is preferred over any other type of transmission line?

10) Explain in brief about parallel strip line and coplanar strip line.

11) State the importance of scattering matrix and explain the properties of scattering matrix.

12) Derive the expression for scattering matrix formulation of E-plane tee.

13) Derive the expression for scattering matrix formulation of H-plane tee.

14) Derive the expression for scattering matrix formulation of Directional coupler

15) Derive the relation for phase velocity and group velocity of TE mode.

16) Explain brief about power transmission through rectangular waveguide with mathematical expression.

17) Find the ABCD parameters of a two port network consisting of a series impedance Z between ports 1 and 2.

18) State the role of impedance and admittance matrix in microwave network. Show the impedance and admittance matrix for N port microwave network.

19) Write down ABCD matrix for a two port network and a cascade connection of two port network.

20) State and explain the limitations of conventional tube

21) What is transit time in tube? Explain the effect of transit time for low and microwave frequency.

22) Draw and explain in brief working of klystron amplifier with applegate diagram.

23) Draw and explain in brief the working principle of Reflex klystron with Applegate diagram.

24) Compare two cavity klystron and TWT

25) Draw the construction of π magnetron. Explain in brief working of π magnetron.

26) State the significance of Hull cut off conditions. Write down the formulas for Hull cut off condition in terms of voltage and magnetic flux density.

27) What is velocity modulation process? How it can be achieved in microwave tubes?

28) Explain in detail applications of PIN diode.

29) What is negative resistance? State importance of it in solid state device. How it can be achieved?

30) Explain in detail about RWH theory for Gunn diode.

31) Explain in detail working principle of Tunnel diode with schematic diagram.

32) What is avalanche transit time effect? How it is achieved in IMPATT diode.

33) Write a note on TRAPATT diode

34) Explain Bolometer technique used for low power measurement.

35) State the methods used for attenuation measurement. Explain any one in detail.

36) What is VSWR? Explain in detail measurement of Low VSWR and High VSWR.

37) State the methods used for impedance measurement. Draw and explain the set up for impedance measurement using Reflectometer.

38) State the significance of cut off frequency in rectangular waveguide. Derive the expression for cut off frequency.

39) Define TE mode in rectangular waveguide. State the conditions for TE mode. Write the wave equation for TE mode.

40) Derive the expression for field components of TE mode in rectangular waveguide.

41) What is TM mode in rectangular waveguide. State the conditions for TM mode. Derive the field components of TM mode.

42) An air filled rectangular waveguide has dimensions of a=4cm and b=2cm. Then find following parameters for TE_{10} mode.

1) cut off frequency 2) cut off wavelength 3) phase velocity d) group velocity e) Guided wavelength

43) What is Magic Tee? Derive the scattering matrix used for magic tee.

44) Explain the operation of Magic tee using scattering matrix.

45) Why slow wave structure is required. Draw different slow wave structures used for travelling wave tube. Sate the suitable structure.

46) A two cavity klystron has V_0=500V, R_0=20KΩ, I_0=30mA, f= 2GHz, d=1mm, L=6cm, R_{sh}=5KΩ. Then find

1) Beam velocity 2) Transit time 3) Transit angle 4) Beam coupling coefficient 5) Transit time between two cavity 6) Transit length 7) maximum input voltage 8) The voltage gain

47) Cylindrical magnetron has following operating parameters.

Anode voltage(V0)=10Kv, beam current I_0 =15mA, magnetic flux density B0=2mwb/m2, radius of cathode cylinder a= 4cm, radius of ven edge to center b=8cm then calculate

a) Cyclotron angular frequency b) cut off voltage for fixed Bo c) cut off magnetic flux density for fixed Vo

48) What is meaning of Transfer Electron Device? Explain how negative resistance is achieved using TED.

Class: Final Year B. Tech. (Electronics Engineering) Part II
Sub.: EL-III- Computer Architecture

Question bank

Section I

Questions for 4 marks (Q. 2)

1. Levels of machines in the computer hierarchy.
2. Components of Von Neumann Model architecture
3. System Bus Model
4. Address, Data, and Control bus
5. Typical Computer System
6. Fixed point number representation in detail.
7. Floating point number representation in detail.
8. Conversion of decimal to binary number.
9. Conversion of binary to decimal number.
10. Conversion hexadecimal number to decimal number
11. Conversion decimal number to hexadecimal number
12. Algorithm for Floating point addition
13. Algorithm for Floating point subtraction
14. Algorithm for Floating point multiplication
15. Algorithm for Floating point division
16. ARC RISC processor data transfer instructions
17. Hardware components of instruction set architecture
18. Functional behavior of RAM cell with diagram.
19. Normalized scientific notation with suitable example.
20. Addressing modes in ARC RISC processor.
21. Memory hierarchy in a computer system.
22. ARC RISC processor arithmetic instructions
23. ARC RISC processor logical instructions
24. Interfacing Techniques
25. Programmed IO communication method

Questions for 6 marks (Q. 3)

1. IEEE 754 standard format used to store floating point number in memory.
2. What is fetch execute cycle? Draw and explain an example of data path.
3. Explain interrupt driven IO system
4. Use of DMA and its advantages.
5. Represent decimal real number in a floating point representation with a sign bit, a 8-bit exponent, and 23 bits mantissa in a normalized notation in base 2.
6. Represent decimal real number in a floating point representation in single word precision IEE754 representation

7. Represent decimal real number in a floating point representation in double word precision IEE754 representation
8. Hardware for high performance addition
9. Hardware for high performance subtraction
10. Implementation of ripple carry adder
11. Implementation of carry look ached adder
12. Implementation of a serial multiplier for 4 bit multiplication.
13. Write the ARC processor assembly program with meaning of each instruction for addition of two eight bit numbers
14. Comparison between various communication methods
15. Comparison between various DDR memories.

Section II

Questions for 4 marks (Q. 4)

1. Main stream classes of computing environment.
2. Classes of parallelism
3. Parallel architecture- meaning, and advantages.
4. Basic structure of centralized shared memory multiprocessor based on multi core chip.
5. Explain hardware based speculation.
6. Explain the processor performance equation.
7. Explain overcoming data hazards with dynamic scheduling
8. What are the challenges of parallel processing?
9. Multiprocessor cache coherence.
10. Explain basic compiler techniques for exposing instruction level parallelism.
11. Basic compiler techniques for exposing instruction level parallelism.
12. Factors which affect the cost of computing system
13. Quantitative principles of computer design
14. How to measure and summarize the performance of computing system/
15. How to reduce branch costs with prediction?
16. Symmetric shared memory architectures
17. Distributed shared memory
18. Directory based coherence
19. Concepts and challenges in instruction level parallelism
20. Examples of dynamic scheduling

Questions for 6 marks (Q. 5)

1. The impact of time, volume, commoditization on a cost of computing system
2. What is parallel processing? Explain it with example.
3. Explain basic schemes for enforcing coherence.
4. Explain five implementation techniques which change at a dramatic pace.
5. What is instruction level parallelism? Explain data hazards.
6. Note on a cost of computing system
7. How to measure performance of symmetric shared memory multiprocessors?
8. Trends in power in integrated circuits
9. What are the trends in cost?
10. Method to exploit ILP using multiple issue and static scheduling
11. Methods of overcoming data hazards
12. Increasing Instruction Fetch Bandwidth

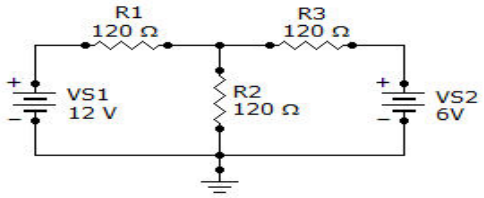
SY B. Tech (E&TC) (Part – I) (CBCS) Examination, 2022

NETWORK THEORY & ANALYSIS

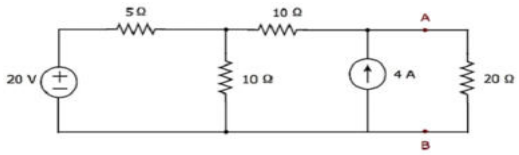
Section I

Q.1) Answer any four of the following (4X4=16)

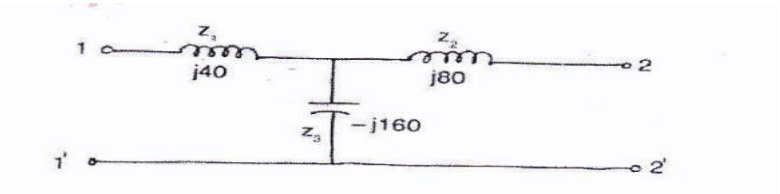
1) Find the current in R_2 of the given circuit, using the superposition theorem.



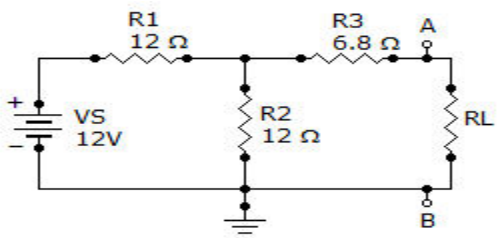
2) Determine the current flowing through 20 Ω resistor of the following circuit using superposition theorem.



3) Derive expression for resonant frequency in series RLC circuit. How the value of R will affect on frequency response.
4) Explain series connection of two port network.
5) Derive ABCD parameters in terms of Z parameters.
6) The Z parameters of two port n/w are Z_{11} =10Ω, Z_{22} = 15 Ω, $Z_{12} = Z_{21}$ =5 Ω. Determine the equivalent T n/w and also determine ABCD parameters.
7) Derive the expression for resonant frequency of a tank circuit.
8) Determine Z parameters of network shown below.



9) Determine Norton's equivalent circuit between terminals A&B from circuit shown in fig.

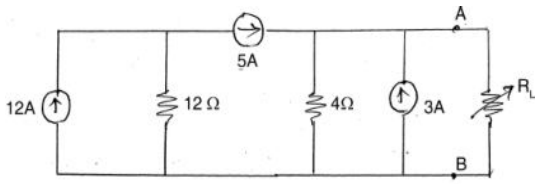


10) Explain cascade connection of two port network.

11) Derive Z parameters in terms of h parameters.

12) Determine the Short circuit circuiting admittance parameters in terms of hybrid parameters.

13) Find the Thevenin's equivalent circuit for the circuit shown between the points A and B.



14) Explain Maximum power transfer theorem and also derive the condition for maximum power transfer theorem for DC circuit.

15) Calculate the value of L at which circuit consisting of parallel connection of two impedances $5+jX_L$ Ω and 10- j12 Ω will resonate at frequency of 1000 rad/ sec.

16) A 100 mH inductor with 500 Ω self-resistance in parallel with a 5nF capacitor. Find the resonant frequency of the combination. Find the impedance at resonance, quality factor of the circuit and the half power bandwidth.

17) By using Norton's theorem, find the current in the load resistor R_L for the circuit shown in fig. a

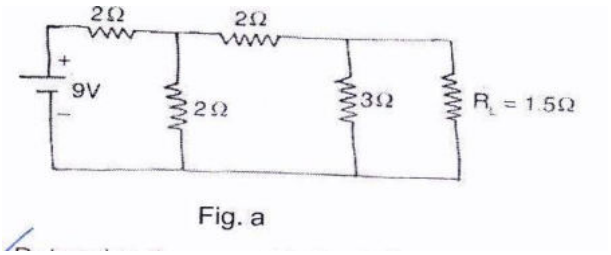


Fig. a

18) Determine Thevenin's Equivalent circuit across terminals A&B from circuit shown below.

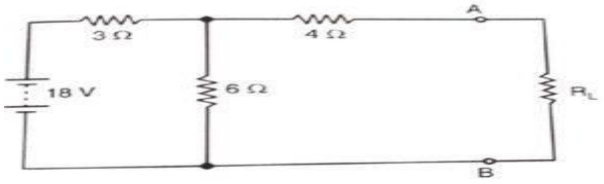
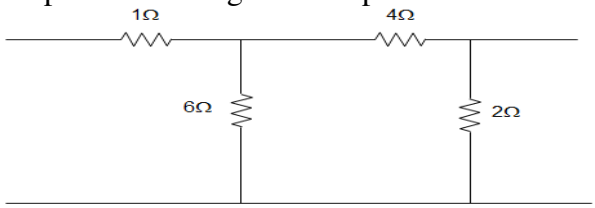
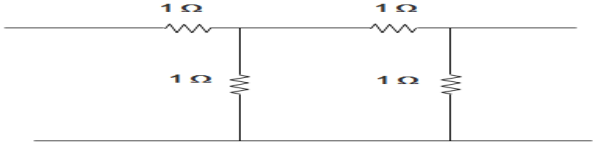


Fig. 22

19) Determine transmission parameters of given two port network.

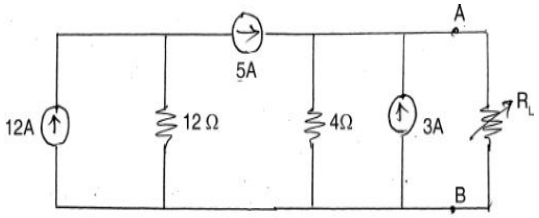


20) Determine h- parameters of given two port network.



Q.3) Answer any Two of the following (2X6=12)

1) Determine the value of R_L for receiving maximum power from source and also find maximum power delivered to the load.



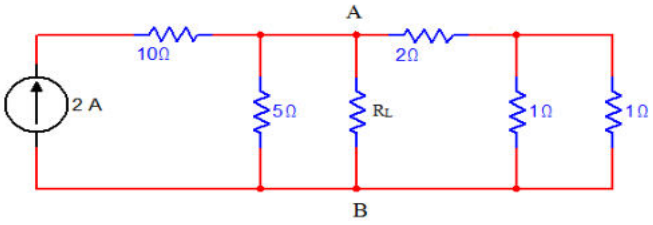
2) A series RLC circuit consists of a 50 Ω resistance, 0.2H inductance and 10 μF capacitor with an applied voltage of 20V. Determine the resonant frequency, quality factor, lower cut off and higher cut off frequencies. Also find bandwidth of the circuit.

3) The port currents for two port network is

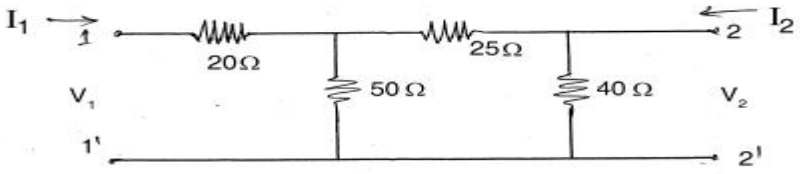
I1 = 2.5V1 – V2

I2= -V1+5V2 Find equivalent π network.

4) Determine the maximum power delivered to the load.

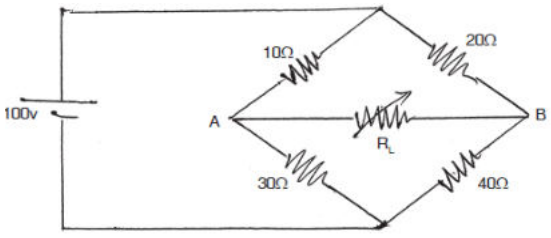


5) Determine short circuit parameters of the network shown in figure below



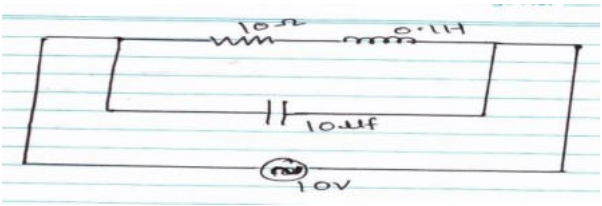
6) Derive the expression for maximum voltage across inductor in series RLC circuit.

7) Determine current passing through R_L=50 Ω using Thevenin's theorem from given circuit shown below.

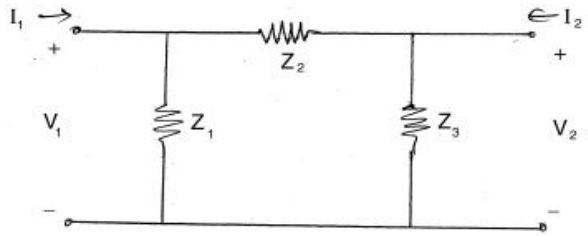


8) Define resonant frequency, bandwidth and quality factor and derive the relationship between them for series RLC resonant circuit.

9) What is parallel resonance? Derive the expression for resonant frequency(fr) of tank circuit. Find f_r for given circuit.



10) Determine the Hybrid parameters for the π -network in the circuit shown Consider Z_1=0.5 Ω, Z_2=1 Ω & Z_3=0.5 Ω.

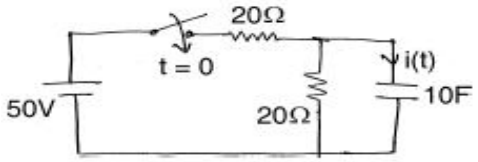


Section II

Q.4) Answer any four of the following (4X4=16)

1) Explain step voltage response for RC series circuit.

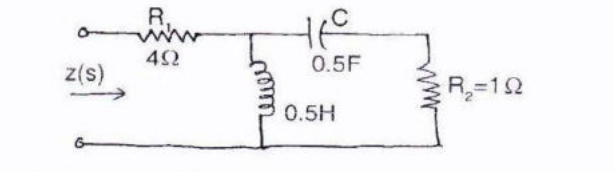
2) Calculate i(t) for t > 0 for the given circuit.



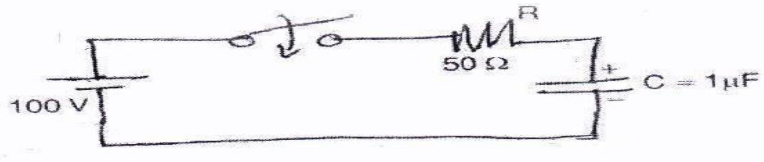
3) Design π type attenuator having 40 dB attenuation with load impedance of 600 Ω.

4) Design constant k type low pass filter (T and π) having cut off frequency of 1 kHz with load resistance of 500 Ω.

5) Calculate the driving point impedance Z(s) of the network shown below. Plot the poles and zeros of the driving point impedance function on S plane.



6) A series RC circuit has R= 50 Ω and C=1μF. The initial charge on capacitor is C=5μF. At t=0, the switch is closed. Find current at t>0.



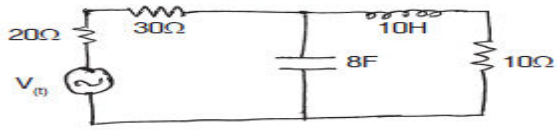
7) Design constant k type High Pass Filter having cut off frequency of 1 kHz with load resistance of 600 Ω.

8) Design **T** type attenuator for attenuation 60 dB with Ro = 500 Ω.

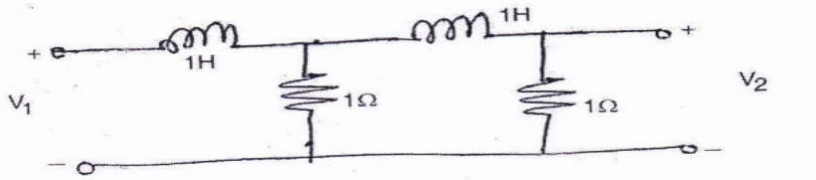
9) Prove that for band pass filter $f_0 = \sqrt{}$ (f1*f2).

10) Design m- derived low pass filter with a cutoff frequency of 500 Hz, m=0.4 and design impedance of 500 Ω.

11) Determine driving point impedance and driving point admittance for the given circuit.



12) For network shown determine transfer function. $G12 = \frac{V1}{V2}$.



13) Give the definition of pole and zero of the network. Draw pole zero diagram for given network

$$I(s) = 20\,S / (S+5)(S+2)$$

14) Draw pole zero diagram for given network function & hence obtain time domain response.

$$Z(s) = 8S/(S+1)(S^2+4S+4)$$

15) Draw pole zero diagram for given network function & hence obtain time domain response V(t)

$$V(s) = 4S/(S+2)(S^2+2S+2)$$

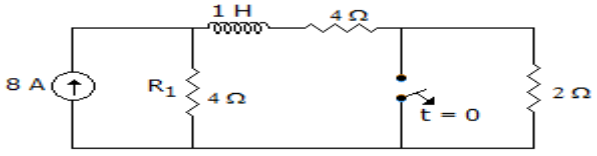
16) What is m-derived filter? What are the advantages of m-derived filters over constant k-type filters? Explain m-derived low pass filter.

17) What are the types of filters and explain characteristics of all filters.

18) For RL circuit, explain step voltage response in detail.

19) What is attenuator? State the purpose for which attenuator is used. Derive relation between decibel and Neper.

20) In figure, the switch has been in closed position for a long time. At t = 0, the switch is opened. Determine the current in R1 at t = 0+.



Q.5) Answer any Two of the following (2X6=12)

1) What are the significance of poles and zeros in network functions? For the transform Current

$$I(S) = \frac{2S}{(S+1)(S+2)}$$

Plot its poles and zeros in S-plane and hence obtain time domain response.

3) Design constant K Band stop filter T and Π Section having cut off frequency of 2 kHz and 6 kHz and a normal impedance of 600 Ω.

4) Design m derived Low Pass Filter T and π section for the given data-cut off frequency 10 KHz, frequency of infinite attenuation 10.1 KHz having design impedance 100 Ω.

5) The series RLC circuit consists of R= 20 Ω, L=0.05 H, C=20 μF with 100 V constant Source, when switch is closed at t=0. Find current i(t) for t>0.

6) Find equation of current i(t) and current at t = 0.5 sec for a given Series RLC Circuit with supply voltage V = 50 V, R = 10 Ω, L = 2H and C = 0.1F Switch is closed at t = 0.

7) For the transform voltage

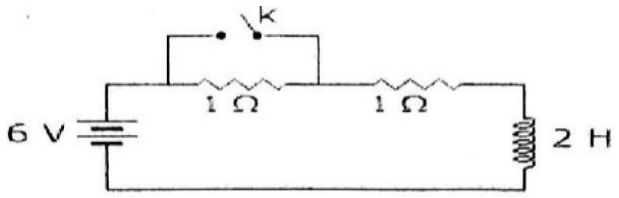
$$V(S) = \frac{5S}{(S+2)(S+4)}$$

Plot its poles and zeros in S-plane and hence obtain time domain response.

8) Design K- type band pass filter having a design impedance of 500 Ω & cut-off frequency of 1 kHz &10 kHz.

9) Design T and Π type attenuator with following specification attenuation: 20 dB, R_0=640 Ω.

10) In the circuit shown in figure, the switch is open for a long time. At t = o the switch is closed. Determine the current supplied by battery at t = o+.



T.Y.B-Tech Examination March-2022

Question Bank
of
T.Y.B-Tech Electrical Self-Learning module-II

Subject: Special Purpose Machines

CBCS (w.e.f. - 2020)

Class: T.Y.B-Tech Electrical **Marks :50**

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Question Paper Format:

Q.1 MCQ Question One Mark each **-** **10M**

Q.2 **Answer Any Five Questions. 8Mark Each** **40M**

Q.1 Answer Any Five Questions. 8Mark Each

1) Explain with phasor diagram torque speed characteristics of synchronous reluctance motor. 8M

2) Explain with neat sketch Constructional feature, Principle of operation permanent magnet DC Motor 8M

3) Explain with neat sketch operation of single stack variable reluctance stepper motor. 8M

4) Derive voltage and torque equation of switched reluctance motor. 8M

5) Explain with neat sketch Static and dynamic characteristics of stepper motor. 8M

6) Explain with neat sketch construction and operating principle of synchronous reluctance motor. 8M

7) Advantages and disadvantages, Applications of Synchronous Reluctance Motors 8M

8) Explain principle of micro stepping used for stepper motor. 8M

9) Explain torque-speed characteristics & State advantages and disadvantages also state applications of switched reluctance motors 8M

10) Explain with neat sketch Vector control of permanent magnet synchronous motor. 8M

11) Write note on classification of stepper motors, explain any one type of stepper motors, application of Stepper Motor. 8M

12) Explain with neat sketch Microprocessor Based Speed control of permanent magnet synchronous motor. 8M

13) Explain with neat sketch Single phase stepping motor Construction, Connection and Principle of Operation of Single phase stepping motor 8M

14) Explain with neat sketch Construction of Synchronous Reluctance Motor& State Advantages and disadvantages, Applications of Synchronous Reluctance Motor 8M

15) Explain with neat sketch Drive system and control circuitry for stepper 8M

16) Write note on Advantages and disadvantages, Applications of Switched Reluctance Motor. 8M

17) Explain with neat sketch Power semiconductor switching circuits of Switched Reluctance Motor. 8M

18) Write note on Constructional feature, Principle of operation of Permanent Magnet Brushless D.C. Motors. 8M

19) Derive Emf equation, Torque equation of Permanent Magnet Brushless D.C. Motors. 8M

20) Explain with neat sketch Power and control circuit of Permanent Magnet Brushless D.C. Motors. 8M

21) State various Advantages and disadvantages, Applications of Permanent Magnet Brushless D.C. Motors. 8M

22) Explain with neat sketch Constructional feature, working Principle of operation of Permanent Magnet Brushless D.C. Motors, Write note on Classification. 8M

23) Derive Emf equation, Torque equation of Permanent Magnet Synchronous Motors. 8M

24) Explain with neat Phasor diagram, torque-speed characteristics of Permanent Magnet Synchronous Motors. 8M

25) Write note on Self-control of Permanent Magnet Synchronous Motors. 8M

26) Write note on Vector control of Permanent Magnet Synchronous Motors. 8M

27) Explain Microprocessor based control strategy of Permanent Magnet Synchronous Motors. 8M

28) Write note on classification of stepper motors, explain any one type of stepper motors, application of Stepper Motor. 8M

29) Explain with neat sketch construction and operating principle of synchronous reluctance motor. 8M

30) Explain with neat sketch Torque – speed characteristics, Phasor diagram Synchronous Reluctance Motors 8M

Department of Electronics Engineering
Class-B.Tech. Electronics
Sub-Power Electronics
Unit-I –Thyristor- principles and characteristics

1. Explain two transistor analogy of SCR.
2. Explain VI Characteristics of thyristors.
3. Explain switching (dynamic) characteristics of thyristors during its turn on & turn off process.
4. Explain the various mechanisms by which thyristors may be turn on.
5. Explain protection scheme for SCR for following

   a> High dv/dt b> high di/dt

6. Explain following methods of over voltage protections circuits
   a) Snubber circuits for dv/dt suppression
   b) Non linear surge suppressor.
   c) Electronic crowbar circuit.
7. Describe methods of over current protections circuits.
8. What do you meant by forced commutation? Explain working of class B resonant pulse commutation technique. Sketch associated waveforms
9. What is commutation? Explain working of class C complementary commutation technique. Sketch associated waveforms
10. Explain working of Class D auxiliary commutation
11. Explain working of Class E & F commutation

Unit 2 – Single Phase Controlled Rectifier

1. Derive an exp for Avg voltage and RMS Voltage for half wave controlled rectifier with resistive load
2. For Single phase fully controlled bridge converter with Resistive load derive an expression for a. Average load voltage b. RMS load voltage
3. For Single phase fully controlled bridge converter with Inductive load derive an expression for a. Average load voltage b. RMS load voltage
4. Derive an exp for Average voltage and RMS Voltage for single phase semiconverter with resistive load. Sketch associated waveforms.
5. Explain with neat circuit diagram basic principle of Single phase dual converter with non circulating current mode and circulating current mode
6. Explain operation of single phase dual converter with circulating current mode. Derive an expression for circulating current. Draw its associated waveforms
7. Compare circulating and non circulating current mode of Single phase dual converter
8. Discuss microcontroller/DSP based firing scheme for single phase controlled rectifiers
9. A single phase semiconverter is operated from 120V,600Hz AC supply. The R_L is 20Ω.If the average output voltage is 25% of the maximum possible output voltage. Determine
   a. Firing angle b. Average DC voltage
10. A single phase fully controlled bridge rectifier is connected to 240V,60Hz AC supply with resistive load and delivering a load current of 10A. A delay angle is 40^0. Calculate
    a. Average output voltage b.RMS output voltage.

Unit 3- Three phase controlled rectifiers

1. Derive an expression of average dc output voltage of three phase half wave controlled rectifier with resistive load. Draw associated waveforms.
2. Derive the expression for average output voltage and RMS output voltage of Three Phase half wave controlled rectifier for continuous conduction mode. Draw neat waveform for $\alpha = 30^0$ Assuming purely resistive load.
3. Derive an expression for V_{dc} and V_{rms} of three phase semiconverter with resistive load for continuous conduction mode. Draw neat waveform for $\alpha = 30^0$.
4. Derive an expression for average DC voltage for three phase full controlled bridge converter with resistive load. Draw neat waveform for $\alpha = 30^0$
5. Explain operation of Three phase full controlled bridge converter with inductive load. Derive the expression for V_{dc} , I_{dc} .Draw neat waveform for $\alpha = 60^0$
6. Design microcontroller based firing scheme for Three phase fully controlled rectifiers.
7. With suitable circuit diagram explain operation of three phase dual converter.
8. A three phase semiconverter is operated from 3phase 440V 50Hz mains supply and delivers power to sufficiently large inductive load having resistance of 20Ω. If it is required that average output voltage should be 60% of maximum possible voltage. Calculate
   a. Firing angle
   b. Power delivered to load
   c. PIV
9. Explain operation of three phase fully controlled rectifier with highly inductive load. Derive an expression for average load voltage. Draw voltage waveform for $\alpha = 60^0$.
10. A Three phase controlled bridge converter is operated from 440V, 3φ, 50Hz mains. The load resistor of 10Ω.If it is required to obtain an average output voltage of 50% of the maximum possible voltage. Estimate average output voltage and current of converter, delay angle & ratings of SCRs.

Unit 4 - Choppers:

1. Explain working of Jones chopper with neat circuit diagram
2. Explain working of Class A,B,C and D chopper
3. Explain working of Class E chopper.
4. Describe Voltage commutated chopper with associated voltage and current waveform as a function of time.
5. Describe the principle of step-up chopper. Derive an expression for the average output voltage in terms of input dc voltage & duty cycle.
6. Derive an expression for output voltage and equation for minimum and maximum load current of step up chopper. Sketch associated waveforms..
7. Explain working of step down chopper and derive an expression for output voltage , duty cycle and effective input resistance.
8. Explain time ratio control and current limit control strategies used for choppers.
9. Explain working multiphase chopper circuit and explain why phase shifted operating mode is preferred.
10. Describe load commutated chopper with associated voltage and current waveform as a function of time.
11. Explain working of morgans chopper with associated voltage and current waveform as a function of time.
12. A DC step down chopper has resistive load R=15Ω and input voltage Vs=180V.When chopper is in conduction state its voltage drop is 1.6V.The chopper frequency is 1KHz. If duty cycle is 55%.Calculate

    i. Average output voltage ii.RMS output voltage

    iii.Chopper efficiency iv. Effective input resistance of chopper.

Unit 5 - Cycloconverter:

Q.1 Explain operation of single phase midpoint cycloconverter with resistive load. The frequency is $f_o/f_s = 1/5$ .Sketch associated waveforms

Q2. Explain working of three phase to three pulse cycloconverter.

Q3. Describe operation of three phase to single phase cycloconverter.

Q4. Explain working of six pulse cycloconverter with resistive load. The frequency ratio is $f_0/f_s = 1/5$. Sketch associated output waveforms

Q5. Explain operation of single phase bridge type cycloconverter with resistive load. The frequency is $f_o/f_s = 1/6$ .Sketch associated waveforms

Q6. Draw the neat circuit diagram of three phase to single phase cycloconverter with resistive load. The frequency ratio is $f_0/f_s = 1/4$. Sketch associated waveforms.

Q7. Derive an expression for output voltage of phase controlled cycloconverter.

Q8. What is cyclomultiplier? Design 1:4 single phase cyclomultiplier. Sketch associated Waveforms

Q9.Describe operation of three phase to three phase cycloconverter

Q10. Design 4:1 stepdown cycloconverter with associated Waveforms.

Q11. Describe the control circuit block diagram for three phase cycloconverter.

Unit 6- Inverters

Q.1 Explain operation of single phase half bridge MOSFET/IGBT based voltage source inverter with i) Resistive load ii.) Inductive load. Draw associated waveforms and derive an expression of RMS output voltage

Q2. Explain operation of single phase full bridge MOSFET/IGBT based voltage source inverter with resistive load. Derive an expression of RMS output voltage.

Q3.Explain operation of single phase full bridge inverter with inductive load. Draw following waveforms
i> Input voltage and input current.
ii> Output voltage and Output current
iii> Feedback diode current waveforms.
iv>Voltage across transistor.

Q4.Explain the following performance of inverters.
i>Harmonic factor of n^{th} harmonic. ii>Total harmonic distortion
iii>Distortion factor iv>Lowest order harmonic

Q5. Derive an expression of RMS value of n^{th} harmonic component for single phase half bridge square wave inverter.

Q6. Derive an expression of RMS value of n^{th} harmonic component for single phase full bridge square wave inverter.

Q7. A single phase full bridge square wave inverter of 10Ω and DC input voltage is Vs = 250V. Determine. a> RMS output voltage at the fundamental frequency b> Output power Po c>Average and peak current of each transistor d> PIV

Q8 Explain working of three phase bridge inverter 180^0 conduction mode. Derive an expression for RMS value of line and phase voltage. Draw line & phase voltage waveforms by considering V_{dc}=300V & load resistor R1=R2=R3= 50Ω

Q09. Explain working of 120^0 conduction mode, three phase bridge inverter feeding star connected purely resistive load. Draw associated line and phase voltage.

Q10. Compare 180^0 mode and 120^0 conduction mode of 3φ transistorized bridge inverter.

Q11.Why voltage control is essential in inverter circuit? Explain voltage control methods by controlling dc input voltage.

Q12.Explain working of single pulse modulation technique. Derive an expression of RMS output voltage. How it eliminates n^{th} harmonic component from output voltage.

Q13. Explain working of multiple pulse modulation technique. Derive an expression of RMS output voltage.

Q14. Explain working of sinusoidal pulse modulation technique.

Q15.State the need for reduction of harmonics in Inverter. Explain harmonics reduction techniques.

Q16. Explain harmonics reduction techniques Using transformer connection. How it eliminates 5^{th} harmonic component.

Q17. Explain harmonics reduction techniques using stepped wave inverter.

Q18.How output voltage is controlled using phase displacement control method in square wave inverters?

Q19. State different methods of voltage control inverters. Describe about PWM control in inverter.

Q20. Explain how lower order harmonics are reduced using PWM techniques

Q21. With neat circuit diagram and appropriate waveforms explain working of basic parallel inverter.

Q23 Explain operation of series resonant inverter. Sketch associated waveforms. State limitations of this circuit.

Q24. Explain operation of improved series inverter. Draw associated voltage and current waveforms

Q25. Explain operation of half bridge series resonant inverter. How can output frequency higher than ringing frequency be obtained in series resonant inverters?

Q26. Explain operation of full bridge series resonant inverter. Draw associated voltage and current waveforms

Q27. With neat circuit diagram and appropriate waveforms explain working of parallel inverter with highly inductive load (Modified parallel inverter).

Q28. Differentiate between series inverter and parallel inverter.

Q29. Explain need of harmonic reduction in inverter with different techniques.

Unit 7- Control of AC & DC drive

1. Explain block schematic of microcontroller based four quadrant AC drive with help of flow chart.
2. Explain working of four quadrant closed loop control of induction motor.
3. Explain working of single quadrant closed loop control of induction motor.
4. Draw a block diagram of microcontroller based speed control of four quadrant AC drive and explain its working.
5. With suitable block diagram describe the working of speed control of DC drive using fuzzy logic controller.
6. Explain working of three phase cycloconverter drive.
7. Explain operation of phase locked loop control system for DC motor.
8. Explain block schematic of microcontroller based four quadrant DC drive with help of flow chart.
9. Draw the block diagram and explain operation of closed loop DC motor control with inner current loop

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8. What do you meant by forced commutation? Explain working of class B resonant pulse commutation technique. Sketch associated waveforms
9. What is commutation? Explain working of class C complementary commutation technique. Sketch associated waveforms
10. Explain working of Class D auxiliary commutation
11. Explain working of Class E & F commutation

Unit 2 – Single Phase Controlled Rectifier

1. Derive an exp for Avg voltage and RMS Voltage for half wave controlled rectifier with resistive load
2. For Single phase fully controlled bridge converter with Resistive load derive an expression for a. Average load voltage b. RMS load voltage
3. For Single phase fully controlled bridge converter with Inductive load derive an expression for a. Average load voltage b. RMS load voltage
4. Derive an exp for Average voltage and RMS Voltage for single phase semiconverter with resistive load. Sketch associated waveforms.
5. Explain with neat circuit diagram basic principle of Single phase dual converter with non circulating current mode and circulating current mode
6. Explain operation of single phase dual converter with circulating current mode. Derive an expression for circulating current. Draw its associated waveforms
7. Compare circulating and non circulating current mode of Single phase dual converter
8. Discuss microcontroller/DSP based firing scheme for single phase controlled rectifiers
9. A single phase semiconverter is operated from 120V,600Hz AC supply. The R_L is 20Ω.If the average output voltage is 25% of the maximum possible output voltage. Determine
   a. Firing angle b. Average DC voltage
10. A single phase fully controlled bridge rectifier is connected to 240V,60Hz AC supply with resistive load and delivering a load current of 10A. A delay angle is 40^0. Calculate
    a. Average output voltage b.RMS output voltage.

Unit 3- Three phase controlled rectifiers

1. Derive an expression of average dc output voltage of three phase half wave controlled rectifier with resistive load. Draw associated waveforms.
2. Derive the expression for average output voltage and RMS output voltage of Three Phase half wave controlled rectifier for continuous conduction mode. Draw neat waveform for $\alpha = 30^0$ Assuming purely resistive load.
3. Derive an expression for V_{dc} and V_{rms} of three phase semiconverter with resistive load for continuous conduction mode. Draw neat waveform for $\alpha = 30^0$.
4. Derive an expression for average DC voltage for three phase full controlled bridge converter with resistive load. Draw neat waveform for $\alpha = 30^0$
5. Explain operation of Three phase full controlled bridge converter with inductive load. Derive the expression for V_{dc} , I_{dc} .Draw neat waveform for $\alpha = 60^0$
6. Design microcontroller based firing scheme for Three phase fully controlled rectifiers.
7. With suitable circuit diagram explain operation of three phase dual converter.
8. A three phase semiconverter is operated from 3phase 440V 50Hz mains supply and delivers power to sufficiently large inductive load having resistance of 20Ω. If it is required that average output voltage should be 60% of maximum possible voltage. Calculate
   a. Firing angle
   b. Power delivered to load
   c. PIV
9. Explain operation of three phase fully controlled rectifier with highly inductive load. Derive an expression for average load voltage. Draw voltage waveform for $\alpha = 60^0$.
10. A Three phase controlled bridge converter is operated from 440V, 3φ, 50Hz mains. The load resistor of 10Ω.If it is required to obtain an average output voltage of 50% of the maximum possible voltage. Estimate average output voltage and current of converter, delay angle & ratings of SCRs.

Unit 4 - Choppers:

1. Explain working of Jones chopper with neat circuit diagram
2. Explain working of Class A,B,C and D chopper
3. Explain working of Class E chopper.
4. Describe Voltage commutated chopper with associated voltage and current waveform as a function of time.
5. Describe the principle of step-up chopper. Derive an expression for the average output voltage in terms of input dc voltage & duty cycle.
6. Derive an expression for output voltage and equation for minimum and maximum load current of step up chopper. Sketch associated waveforms..
7. Explain working of step down chopper and derive an expression for output voltage , duty cycle and effective input resistance.
8. Explain time ratio control and current limit control strategies used for choppers.
9. Explain working multiphase chopper circuit and explain why phase shifted operating mode is preferred.
10. Describe load commutated chopper with associated voltage and current waveform as a function of time.
11. Explain working of morgans chopper with associated voltage and current waveform as a function of time.
12. A DC step down chopper has resistive load R=15Ω and input voltage Vs=180V.When chopper is in conduction state its voltage drop is 1.6V.The chopper frequency is 1KHz. If duty cycle is 55%.Calculate

    i. Average output voltage ii.RMS output voltage

    iii.Chopper efficiency iv. Effective input resistance of chopper.

Unit 5 - Cycloconverter:

Q.1 Explain operation of single phase midpoint cycloconverter with resistive load. The frequency is $f_o/f_s = 1/5$ .Sketch associated waveforms

Q2. Explain working of three phase to three pulse cycloconverter.

Q3. Describe operation of three phase to single phase cycloconverter.

Q4. Explain working of six pulse cycloconverter with resistive load. The frequency ratio is $f_0/f_s = 1/5$. Sketch associated output waveforms

Q5. Explain operation of single phase bridge type cycloconverter with resistive load. The frequency is $f_o/f_s = 1/6$ .Sketch associated waveforms

Q6. Draw the neat circuit diagram of three phase to single phase cycloconverter with resistive load. The frequency ratio is $f_0/f_s = 1/4$. Sketch associated waveforms.

Q7. Derive an expression for output voltage of phase controlled cycloconverter.

Q8. What is cyclomultiplier? Design 1:4 single phase cyclomultiplier. Sketch associated Waveforms

Q9.Describe operation of three phase to three phase cycloconverter

Q10. Design 4:1 stepdown cycloconverter with associated Waveforms.

Q11. Describe the control circuit block diagram for three phase cycloconverter.

Unit 6- Inverters

Q.1 Explain operation of single phase half bridge MOSFET/IGBT based voltage source inverter with i) Resistive load ii.) Inductive load. Draw associated waveforms and derive an expression of RMS output voltage

Q2. Explain operation of single phase full bridge MOSFET/IGBT based voltage source inverter with resistive load. Derive an expression of RMS output voltage.

Q3.Explain operation of single phase full bridge inverter with inductive load. Draw following waveforms
i> Input voltage and input current.
ii> Output voltage and Output current
iii> Feedback diode current waveforms.
iv>Voltage across transistor.

Q4.Explain the following performance of inverters.
i>Harmonic factor of n^{th} harmonic. ii>Total harmonic distortion
iii>Distortion factor iv>Lowest order harmonic

Q5. Derive an expression of RMS value of n^{th} harmonic component for single phase half bridge square wave inverter.

Q6. Derive an expression of RMS value of n^{th} harmonic component for single phase full bridge square wave inverter.

Q7. A single phase full bridge square wave inverter of 10Ω and DC input voltage is Vs = 250V. Determine. a> RMS output voltage at the fundamental frequency b> Output power Po c>Average and peak current of each transistor d> PIV

Q8 Explain working of three phase bridge inverter 180^0 conduction mode. Derive an expression for RMS value of line and phase voltage. Draw line & phase voltage waveforms by considering V_{dc}=300V & load resistor R1=R2=R3= 50Ω

Q09. Explain working of 120^0 conduction mode, three phase bridge inverter feeding star connected purely resistive load. Draw associated line and phase voltage.

Q10. Compare 180^0 mode and 120^0 conduction mode of 3φ transistorized bridge inverter.

Q11.Why voltage control is essential in inverter circuit? Explain voltage control methods by controlling dc input voltage.

Q12.Explain working of single pulse modulation technique. Derive an expression of RMS output voltage. How it eliminates n^{th} harmonic component from output voltage.

Q13. Explain working of multiple pulse modulation technique. Derive an expression of RMS output voltage.

Q14. Explain working of sinusoidal pulse modulation technique.

Q15.State the need for reduction of harmonics in Inverter. Explain harmonics reduction techniques.

Q16. Explain harmonics reduction techniques Using transformer connection. How it eliminates 5^{th} harmonic component.

Q17. Explain harmonics reduction techniques using stepped wave inverter.

Q18.How output voltage is controlled using phase displacement control method in square wave inverters?

Q19. State different methods of voltage control inverters. Describe about PWM control in inverter.

Q20. Explain how lower order harmonics are reduced using PWM techniques

Q21. With neat circuit diagram and appropriate waveforms explain working of basic parallel inverter.

Q23 Explain operation of series resonant inverter. Sketch associated waveforms. State limitations of this circuit.

Q24. Explain operation of improved series inverter. Draw associated voltage and current waveforms

Q25. Explain operation of half bridge series resonant inverter. How can output frequency higher than ringing frequency be obtained in series resonant inverters?

Q26. Explain operation of full bridge series resonant inverter. Draw associated voltage and current waveforms

Q27. With neat circuit diagram and appropriate waveforms explain working of parallel inverter with highly inductive load (Modified parallel inverter).

Q28. Differentiate between series inverter and parallel inverter.

Q29. Explain need of harmonic reduction in inverter with different techniques.

Unit 7- Control of AC & DC drive

1. Explain block schematic of microcontroller based four quadrant AC drive with help of flow chart.
2. Explain working of four quadrant closed loop control of induction motor.
3. Explain working of single quadrant closed loop control of induction motor.
4. Draw a block diagram of microcontroller based speed control of four quadrant AC drive and explain its working.
5. With suitable block diagram describe the working of speed control of DC drive using fuzzy logic controller.
6. Explain working of three phase cycloconverter drive.
7. Explain operation of phase locked loop control system for DC motor.
8. Explain block schematic of microcontroller based four quadrant DC drive with help of flow chart.
9. Draw the block diagram and explain operation of closed loop DC motor control with inner current loop

P. A. H. Solapur University, Solapur
T.Y. B. Tech. (Electronics) Part II
Technical Self Learning Module-I:
Robotics

Sample Question for five marks.

1 Classify and explain with neat diagram any two robots.
2 List and elaborate any two control methods of robotics.
3 What is the need of sensors? Give its classification.
4 What are the different key issues for locomotion in mobile robots?
5 List and elaborate any two position sensor.
6 Classify the different control scheme for mobile robots and explain any one in detail.
7 List and elaborate any two control schemes of robotics.
8 Classify robots based on coordinate systems. Explain spherical coordinate robot.
9 Explain welding application of robot with neat diagram.
10 What is the need of sensors? Give its classification.
11 With neat sketch explain working of proximity sensor.
12 List and elaborate any two velocity sensor.
13 With neat sketch explain working of vision-based sensors.
14 Classify different sensors used in robots.
15 Explain grinding application of robot with neat diagram.
16 Explain spray painting application of robot with neat diagram.
17 List down the types of end effectors. Discuss mechanical gripper with neat diagram.
18 List different robot programming methods.
19 What are the different key issues for locomotion in mobile robots?

Sample Question for ten marks.

1 Describe functionality of robot system with neat sketch.
2 Describe working of mobile robotics with neat sketch.
3 Compare stationary and mobile robots based on construction, speed, capacity and applications.
4 With neat sketch explain basic visual sensing system.
5 With neat sketch explain basic visual sensing system.
6 Describe operations and functions of machine vision in detail.
7 Describe the steps involved in preventive maintenance.
8 Classify robots based on control methods. Elaborate any one in detail.
9 Identify and discuss the major components of robot system.
10 With neat sketch explain legged mobile robots.
11 With neat sketch explain wheeled mobile robots.
12 Classify robots based on control methods. Explain non servo controlled robots.
13 Classify robots based on control methods. Explain servo controlled robots.

T.Y.B.Tech (Electronics & Telecommunication Engineering)
Subject: Antenna & Wave Propagation[ET321]
SEM-II

1) Explain antenna action. Define any of its four parameter.
2) Define radiation intensity and beam efficiency. Relate directivity and gain G.
3) Compare antenna and transmission line.
4) Write short note on HPBW and F NBW.
5) Define polarization. Explain different types of polarization.
6) What is Antenna aperture. Explain different types of antenna aperture.
7) Explain different antenna field zones.
8) Write short note on radiation pattern of antenna.
9) Define: Bean Area, Beam Width, Beam Efficiency .
10) Related to antenna define the following terms: Directivity, Antenna Efficiency, Radiation Resistance, and Antenna Gain.
11) Derive the relationship between radiation resistance and efficiency.
12) Write short note on effective height of antenna.
13) Problem's on antenna parameter.
14) What is mean by uniform linear array? What different types of array.
15) Define array factor. List out the expression of beam width for broad side and end fire array.
16) State principle of pattern multiplication What is the advantage of pattern multiplication?
17) Find out Electric field of 2 isotropic point sources of same amplitude and same phase.
18) Find out electric field of 2 isotropic point sources of same amplitude and opposite phase.
19) Find out radiation pattern of 2 point sources array separated by half wavelength.
20) Explain pattern multiplication of 4 Or 8 point sources.
21) What is necessity of array. State properties of broadside and end fire array.
22) With radiation pattern, beam width & null direction explain broadside or end fire array.
23) Write difference between antenna and complementary slot(dipole) antenna
24) Explain feeding methods of slot antenna
25) Define pitch angle of helical antenna explain the effect of pitch angle on helical antenna
26) Write short note on small electric dipole
27) Explain construction and working of half wave dipole or mono pole draw its radiation pattern
28) Explain different modes of operation of helical antenna

29) State different characteristics of antenna also state its advantages and disadvantages and applications
30) Explain slot antenna with construction and working
31) State babinet principle discuss how it works in slot antenna
32) Problem's on Horn, Helical antenna
33) Explain the principle of horn antenna and discuss the various forms of horn antenna
34) obtain the design equation of horn antenna discuss on different types of feed used with neat diagram.
35) Explain horn antenna with construction and working state its advantages and dis advantages draw radiation pattern of horn antenna
36) write Short note on optimum horn
37) What is Horn Antenna? Sketch the various types of Horn Antenna and explain its operation.
38) Draw different shapes of microstrip antenna state advantages dis advantages and applications of it
39) Discuss different feeding technique of patch antenna
40) Explain construction and working of patch antenna draw its radiation pattern
41) Explain different types of reflector state advantages of parabolic reflector
42) Explain construction and working of parabolic antenna with its radiation pattern
43) State different pattern characteristics of parabolic antenna
44) Discuss different feeding method in parabolic antenna
45) Discuss The role of f/d ratio in parabolic reflector(f -focal length ,D-diameter of the reflector)
46) What is reflector antenna? With necessary diagrams, explain parabolic reflector antenna
47) Write short note on frequency independent antenna
48) Explain spiral antenna in detail
49) With suitable diagram explain construction and working of log periodic antenna state advantages of it
50) Write short note on modern antenna
51) What is active antenna compare active and passive antenna
52) Explain how smart antenna works.
53) Discuss different gain measurement methods of antenna
54) Explain radiation pattern measurement of antenna
55) How polarization type of antenna is identified
56) Explain how reconfigurable antenna works.
57) Explain different modes of propagation
58) Write short note on ground wave propagation
59) Discuss flat Earth and curved earth concept
60) Define- virtual height critical frequency maximum usable frequency skip distance

61) Define fading, multihop Propagation.

62) With neat sketch explain duct propagation/ /tropospheric propagation/ sky wave propagation.

63) Explain the mechanism of troposcatter propagation

64) Describe the structure of the atmosphere and specify the factors affecting the radio wave propagation.

P. A. H. Solapur University, Solapur
Final Year B. Tech. (Electronics) Sem-II
Audio Video Systems
Question Bank

Unit 1: Fundamentals of Audio System

1. Define amplitude, frequency, phase, and wavelength for a sound wave. Derive the relationship between velocity, frequency and wavelength.
2. Discuss the terms acoustics, reverberation, absorption coefficient, growth and decay of sound.
3. How sound is optically recorded on photographic film using variable density method?
4. Illustrate with neat diagram optical sound recording.
5. Write down step by step procedure for producing records.
6. With a neat block diagram describe the principle of Disc recording.
7. If the gapwidth is 6 microns and the speed of tape is 4.75cm/s, calculate the maximum frequency of recording. What will happen if the tape speed is increased to 19cm/s? Comment for video frequencies.
8. If the velocity of sound at 0 degree Celsius is 332m/s, calculate (a) Velocity at 40^{o}C (b) wavelength for sound of 200Hz at 30^{o}C and 0^{o}C.
9. List out the principle factors related to auditorium design in detail.
10. Explain how energy contained in a sound wave are related to the frequency. Explain that a bandwidth of less than 4 KHz is sufficient for telephone.

P. A. H. Solapur University, Solapur
Final Year B. Tech. (Electronics) Sem-II
Audio Video Systems
Question Bank

Unit 2: Fundamentals of Television System

1. Define the terms, Kell Factor, Aspect Ratio, Chrominance and Flicker.
2. Elaborate the terms Horizontal & Vertical Resolution in TV.
3. Give the comparison between Interlace scanning & Progressive scanning in detail.
4. Discuss with a neat block diagram generalized colour TV receiver.
5. Discuss why is FM preferred to AM for sound signal transmission.
6. Synchronizing pulses transmitted along with the picture signal justify the statement.
7. Describe the basic principle of monochrome television transmission and reception.
8. How is the illusion of continuity created in television pictures? Why has the frame reception rate been chosen to be 25 and not 24 as in motion pictures?
9. Draw a picture frame chart showing the total number of active and inactive lines during each field and establish the need for terminating the first field in a half line and the beginning the second at the middle of a line at the top.
10. Justify the choice of 625 lines for TV transmission. Why the total number of lines is kept odd in all television systems? What is the significance of choosing the number of lines as 625 and not 623 or 627?
11. The relevant data for a closed circuit TV system is given below. Calculate the highest modulating frequency that will be generated while scanning the most stringent case of alternate black and white dots for equal vertical and horizontal resolution.
    No. of lines = 250
    Interlace ratio = 1:1
    Picture repetition rate = 50/sec
    Aspect ratio = 4/3
    Vertical retrace time = 10% of the picture frame time
    Horizontal retrace time = 20% of the total line time
    Assume resolution factor = 0.8

P. A. H. Solapur University, Solapur
Final Year B. Tech. (Electronics) Sem-II
Audio Video Systems
Question Bank

Unit 3: Colour Television Standards

1. With a neat diagram discuss additive & subtractive colour theory.
2. Compare NTSC and PAL colour television standards.
3. Discuss the PAL TV standard in detail.
4. With a neat diagram explain TV Broadcasting system.
5. What do you understand by compatibility in TV transmission? Enumerate essential requirements that must be met to make a colour system fully compatible.
6. Discuss how the 'Y' and colour difference signals are developed from camera outputs. Why is the 'Y' signal set = 0.3R + 0.59G – 0.11B?
7. Discuss the factors which influence the choice of sub-carrier frequency in a colour TV system. Justify the choice of 3.579545 MHz as the subcarrier frequency in the NTSC system. How does it affect the line and field frequencies?
8. Discuss why is the modulated sub-carrier vectors shifted by 33° to constitute Q and I signal in the NTSC system? Why different bandwidths are assigned to Q and I signals?
9. There vertical line up dots occur in hue of colour TV how these can be overcome and also give the relationship between fsc, fh and fv.
10. From the data calculate the Colour Subcarrier for Unweighted parameters.
11. From the data calculate the Colour Subcarrier for Weighted parameters.
12. Explain with a suitable block diagram the encoding process in the PAL colour system. Why is the colour burst signal transmitted after each scanning line?

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Final Year B. Tech. (Electronics) Sem-II
Audio Video Systems
Question Bank

Unit 4: Digital Television

1. Draw a neat block diagram of a digital video transmitter and discuss the function of each block.
2. Discuss advantages of digital television.
3. Explain how surround sound effect is produced in a digital TV system.
4. Discuss how a picture-in-picture feature can be obtained in a TV.
5. Discuss the working of a closed circuit television.
6. What is MATV? How did it originate? Discuss its working.
7. Compare of CATV, CCTV and MATV
8. Discuss the features of H.264.
9. Describe CATV system. How does it differ from MATV system?

P. A. H. Solapur University, Solapur
Final Year B. Tech. (Electronics) Sem-II
Audio Video Systems
Question Bank

Unit 5: Multimedia Components

1. Discuss different MIDI related terms. (Synthesizer, sequencer, MIDI keyboard controller, multi-timbral, polyphony)
2. Discuss different image data types and their file formats.
3. Discuss musical instrument digital interface (MIDI) and its role.
4. List down important MIDI concepts.
5. Define the term Multimedia & Hypermedia with suitable examples.

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Final Year B. Tech. (Electronics) Sem-II
Audio Video Systems
Question Bank

Unit 6: Data Coding and Compression Techniques

1. Discuss bit allocation algorithm for MPEG-1 Layer 1 and Layer 2.
2. Discuss the MPEG audio encoder with suitable block diagram.
3. Discuss the MPEG-1 audio Layers 1 and 2 with suitable block diagram.
4. Discuss the MPEG-1 audio Layers 3 with suitable block diagram.
5. Illustrate with a neat diagram the different layers of MPEG.
6. With a neat diagram discuss JPEG Encoder.
7. List down different JPEG modes and discuss any one mode.
8. Explain three-level hierarchical JPEG encoder.
9. Discuss the terms MPEG & JPEG in detail.
10. Give the difference between lossless & lossy compression techniques?
11. Discuss the benefits offered by compression schemes in designing multimedia systems.

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Final Year B. Tech. (Electronics) Sem-II
Audio Video Systems
Question Bank

Unit 7: Multimedia Applications

1. Compare headphones and headset.
2. Illustrate with a neat diagram the design for PA system for public meeting.
3. With a neat diagram explain Public addressing system for Auditorium.
4. Define virtual reality; also discuss its different forms & applications.

Question Bank

1. List Applications of OOP
2. Explain Java Features & Program Structure
3. Explain terms:
    a. Identifiers
    b. Literals
    c. Keywords
    d. Operators
    e. Variables
4. What is class and constructors and its types?
5. What are different command lines available in java?
6. What are java arrays & strings? How to convert strings into objects
7. Differentiate between shadowing & overriding
8. What are different packages available in java?
9. What is an exception and exception handling and Exception handling?
10. Distinguish between Inheritance vs. aggregation
11. What is the difference Between Final, Finally, and Finalize in Java?
12. What is the difference between Abstract class and Interface
13. What are Exception Handling Keywords in Java?
14. What is Java Interface and why it's needed?
15. Difference between overloading vs. overriding with suitable examples.
16. Distinguish between Procedural and Object Oriented Programming.
17. List the Java Applications
18. Explain in detail structure of Java Program
19. Define Java Identifiers, Keywords and Literals with suitable examples.
20. Define static keywords in java. Explain in detail static variables, blocks and methods with suitable examples
21. Define Array and explain different methods to create string objects with suitable examples
22. Inheritance and Polymorphism and Why do we need to use inheritance?
23. Define below keywords:
    a. Super
    b. Final
    c. Abstract
24. Distinguish between Inheritance and aggregation.
25. What is Packages in java? List its advantages and types
26. Describe different ways to convert Strings to Integer in Java
27. What is a Java package and how is it used?
28. What is the mechanism for handling exceptions in Java?
29. What do you mean by object and class? What is the difference between a class and a structure?
30. What is access specifier in java? List & Explain different access specifiers?
31. What is Java Virtual Machine and difference between bytecode and Machine code?

32. Explain the terms
    i. Package
    ii. Import
    iii. Try-catch
    iv. Super
33. What is multi-catch explain with example?
34. What is improved exception handling in java?
35. What is user defined exception?

P. A. H. Solapur University, Solapur
T.Y. B. Tech. (Electronics) Part II
Technical Self Learning Module-I:
Robotics

Sample Question for five marks.

1 Classify and explain with neat diagram any two robots.
2 List and elaborate any two control methods of robotics.
3 What is the need of sensors? Give its classification.
4 What are the different key issues for locomotion in mobile robots?
5 List and elaborate any two position sensor.
6 Classify the different control scheme for mobile robots and explain any one in detail.
7 List and elaborate any two control schemes of robotics.
8 Classify robots based on coordinate systems. Explain spherical coordinate robot.
9 Explain welding application of robot with neat diagram.
10 What is the need of sensors? Give its classification.
11 With neat sketch explain working of proximity sensor.
12 List and elaborate any two velocity sensor.
13 With neat sketch explain working of vision-based sensors.
14 Classify different sensors used in robots.
15 Explain grinding application of robot with neat diagram.
16 Explain spray painting application of robot with neat diagram.
17 List down the types of end effectors. Discuss mechanical gripper with neat diagram.
18 List different robot programming methods.
19 What are the different key issues for locomotion in mobile robots?

Sample Question for ten marks.

1 Describe functionality of robot system with neat sketch.
2 Describe working of mobile robotics with neat sketch.
3 Compare stationary and mobile robots based on construction, speed, capacity and applications.
4 With neat sketch explain basic visual sensing system.
5 With neat sketch explain basic visual sensing system.
6 Describe operations and functions of machine vision in detail.
7 Describe the steps involved in preventive maintenance.
8 Classify robots based on control methods. Elaborate any one in detail.
9 Identify and discuss the major components of robot system.
10 With neat sketch explain legged mobile robots.
11 With neat sketch explain wheeled mobile robots.
12 Classify robots based on control methods. Explain non servo controlled robots.
13 Classify robots based on control methods. Explain servo controlled robots.

Civil Engineering Department

TY Civil- II

Foundation Engineering

Question Bank

Theory Questions

1. Write in detail about Auger boring with neat sketch.
2. What do you understand by site investigation? What are the different purposes for which the site investigation is done?
3. Write in detail about Rotary drilling with neat sketch**.**
4. Write in detail about wash boring with neat sketch
5. In a site investigation for the design of foundation of a major structure, what kind of detailed information do you set out to obtain?
6. State the assumption made in Terzaghi's analysis.
7. Write a short note on modes of shear failure
8. Discuss the factors affecting bearing capacity of soil
9. Differentiate general local and punching shear failure
10. Write a short note on factors influencing bearing capacity
11. Discuss the effect of water table on the bearing capacity of soil
12. What are the limitation of plate load test?
13. Write a brief note on standard penetration test
14. Mention the limitations of Terzaghi's bearing capacity theory
15. Explain the test procedure for conducting plate load test as per Indian Standards
16. What is expansive soil? What precautions need to be taken while designing foundation in expansive soil?
17. Explain in detail about geotextile and its role in ground improvement.
18. Enlist the ground improvement techniques. Explain any one in detail with its suitability.
19. Explain in detail the Pre-loading methods for ground improvement technique.
20. Write the advantages and limitation of the Pre-loading methods
21. Write a short note on vibro-flotation methods for ground improvement technique
22. Explain in detail about geotextile and its role in ground improvement.
23. List the factors influencing settlement.

24. Explain the concept of elastic settlement.
25. Distinguish between Consolidation Settlement and Immediate settlement
26. What are the different types of settlements of footings? Explain in detail
27. Explain the type of pile based on mechanism of load transfer
28. Write a short note on design and construction of under reamed pile with neat sketch
29. What is negative skin friction? What is its effect on the pile?
30. Write a note on selection on pile
31. Write the uses of piles
32. Compare circular and diaphragm type cofferdam with respect to following points elevation, two advantages and two disadvantages
33. Define grip length and explain how to decide the grip length of a foundation
34. Define tilt and shift of a well. Explain with neat sketch any four techniques of rectifying the tilt of well
35. Explain earth-fill cofferdam with a neat labelled sketch (plan and elevation). Following
    points need to be explained [suitability w.r.t. depth of water, one advantage, one disadvantage]
36. List any six ideal requirements of a cofferdam
37. List out the types of Caissons
38. Write a brief critical note on ‘Taylor’s Stability Number
39. Explain the friction circle method for finding factor of safety of slopes
40. What are different types of slopes failure? explain briefly finite and infinite slopes.

Problems/ Numericals

1. Determine the ultimate bearing capacity of square footing of 1.5 m size, at a depth of 1.5 m,in a pure clay with an unconfined strength of 150 kN/m^2. $\phi = 0^0$ and γ=17 kN/m^3, Take Nc=5.7, Nq=1.0, and Nγ= 0
2. A strip footing of 2 m size, which is laid at a depth of 1.3 m below the ground surface.Determine the net ultimate bearing capacity using IS code method for the following cases, take γ = 20 kN/m^3, ϕ= 30^0 and c = 0, corresponding N_c = 30.14, N_q =18.4, and N_γ = 22.4

   i) When the water table is at base of footing

   ii) When the water table at ground level

3. A sampler has inner diameter of 68mm with its thickness 4mm and cutting edge of sampler has outer diameter of 81mm with its thickness 8mm and determine (a) area ratio (b) inside clearance (c) outside clearance.

4. square footing located at a depth of 1.3 m below the ground has to carry a safe load of 650 kN. Find the size of the footing if the desired factor of safety is 3. The soil has the following properties: Void ratio = 0.45, degree of saturation is 50%, specific gravity is 2.5, c = 6 kN/m^2 , φ = 30º use Terzaghi's analysis. Terzaghi's bearing capacity factors for φ = 300 Nc = 37.2 Nq = 22.5 Nγ = 19.7

5. A square footing placed at a depth of 1 m is required to carry a load of 1000 kN. Find the required size of footing given the following data. C = 10 kPa, = 38º , γ = 19 kN/m 3 , Nc = 61.35, Nq = 48.93, Nγ = 74.03 and F = 3. Assume water table is at the base of footing.

6. Estimate the immediate settlement of a concrete footing 1 m X 1.5 m in size, if it is founded at a depth of 1 m in silty soil whose compression modulus is 9000 kPa. Footing is expected to transmit unit pressure of 200 kPa. Assume I_f = 1.06, μ = 0.3

7. Determine the elastic settlement of a footing 2 m X 3.5 m resting on sandy soil given E_s = 45000 kPa and μ = 0.4. Footing carries a load of 1000 kN. Take I_f = 0.82

8. Design a combined footing for two columns carrying a load of 650 kN and 810 kN. Size ofEach column is 500 mm × 500 mm, c/c distance between column is 4.6 m, length of footing is5.1 m SBC of soil is 200 kN/m^2.

9. Design a combined footing for two columns carrying a load of 760 kN and 900 kN. Size of each column is 450 mm × 450 mm, c/c distance between column is 4.5 m, length of footing is 5 m SBC of soil is 160 kN/m^2.

10. Design a combined trapezoidal footing by using following data
    External column load – 800kN
    Internal column load – 600kN
    C/C spacing between columns – 3.8m
    Size of each column – 400mm

Both column flush with footing and SBC of soil is 120kN/m^2
Draw SFD and BMD

11. Design a strap footing for two columns using following data:
External column (450mm size) flush with boundary carries 600kN load
Internal column (500mm size) carries a load of 1000kN
Spacing c/c of column is 6m and SBC of soil is 150kN/m^2
12. Design footing for two columns by using following data. If size of each column is 0.5m X 0.5m draw plan, elevation, SFD and BMD showing all relevant calculations? Assume suitable data if required for design purpose. External column is at a clear distance of 0.2m from boundary of plot. External column load – 600kN, Internal column load – 900kN, spacing c/c is 4.5 SBC of soil = 200kPa
13. A 30 kN drop hammer was used a R.C pile. It has free fall of 2m. the average penetration recorded in the last few blows is 6mm/blow. Estimate the allowable load on pile according to Engineering news formula
14. A concrete pile 8m long was driven by a single acting Vulcan hammer with rated energy 45.26kJ. The total settlement as recorded for the last 15 blows was 1.5mm/blow. Using engineering news formula calculate the pile capacity.
15. A pre cast R.C.C pile is driven by a steam hammer. Weight of hammer is 30kN. The stroke length of hammer is 0.80m which results in average penetration of 0.4cm in the last few blows of the hammer. Determine safe load on the pile.
16. Determine the load carrying capacity of a wooden pile driven with a drop hammer weighing 50kN and having a free fall of 1.2m by using Engineering news formula the penetration in the last blow is 10mm.
17. A square group of 16 piles penetration through the filled-up soil of 3m depth. The pile diameter is 250mm and pile spacing is 0.75m the unit cohesion of material is 18kN/m^2.And unit weight of soil is 15kN/m3. Compute negative skin friction given adhesion coefficient as 0.4

18. A square group of 9 pile was driven into soft clay extending to a large depth. The diameter and length of the piles were 300mm and 9m respectively. If undrained cohesion is 45kNm3 and the pile spacing is 1 m centre to centre. What is the capacity of group? Take factor of safety of 2.5 adhesion factor is 0.7

19. group of 16 piles of 600mm diameter is arranged in a square pattern with centre to centre spacing of 1.4m the piles are 9m long and are embedded in soft clay with cohesion of 30kN/m^2 bearing resistance may be neglected for the piles. Adhesion factor is 0.75Determine the ultimate load capacity of the pile group.

20. 200mm diameter, 8m long piles are used as foundation for a column in a uniform deposit of medium clay unconfined compressive strength is 100kN/m^2 and adhesion factor is 0.9. There are nine piles arranged in a square pattern of 3x3 for a group efficiency =1 find the spacing between the piles neglect the end bearing.

21. A pre cast concrete pile of diameter 450mm is driven into stiff clay. The unconfined compression strength of the clay is 200kN/m2. Determine the length of pile required to carry a safe load of 400kN with factor of safety=2.5 Assume adhesion factor=0.55

22. Design sheet pile wall for a height of 5.0 m in sandy soil and supporting sandy soil having γ = 16 kN/m^3, c = 0kN/m^2 and ϕ = 30°. Also draw the sketch of wall with design details.
23. Design a cantilever sheet pile which is having following details

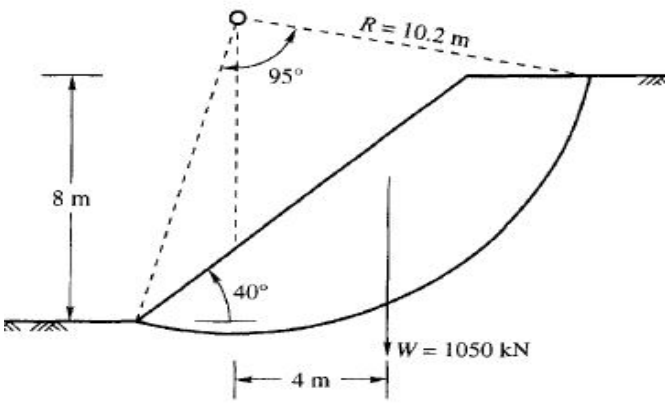
    i) γ = 18 kN/m^3

    ii) $\phi = 36^0$

    iii) Length of sheet pile 6.0 m

24. Determine depth of embedment for a anchored sheet pile using following data Height of wall – 7m Soil above and below dredge line granular $\gamma = 20\, kN/m^3$ c = 0, kN/m^2 and $\varphi = 33^0$ Anchor rods are placed at a depth of 1m below ground level
25. An embankment is inclined at an angle of 35° and its height is 15 m. the unit weight of soil is 18.0 kN/m^3 . if the Taylor's stability number is 0.06. Find the factor of safety with respect to cohesion.
26. Determine the factor of safety with respect to cohesion for a submerged embankment 25m high a slope of 40º. The properties of soils are Φ=10º, c=40kN/m^2
    γ_{sat}=19kN/m^3 Taylor's stability number Sn=0.097

27. Compute the safe height of the slope at factor of safety of 1.5. A slope is to be constructed at on inclination of 60º properties of soil are c=15kN/m^2, Φ=22.5º, γ=18kN/m^3.
28. Determine the factor of safety for a cohesive soil(Φ=0) 7m high, if its stability number is known is to be 0.156. the slope material has cohesion =25kN/m^2, and unit weight =18.5kN/m^3.
29. A cutting is to be made in clay for which the cohesion is 35kN/m2 and Φ=0, the density of the soil is 20kN/m3. Find the maximum depth for a cutting of side slope 1.5:1 if the factor of safety is to be 1.5 take the stability number for 1.5:1 slope and Φ=0, as 0.17.
30. A 40° cutting slope is excavated to a depth of 8 m in a deep layer of saturated clay of unit weight 19 kN/m^3: the relevant shear strength parameters are C_u = 65 kPa. Determine the factor of safety for the trial failure surface specified in Figure.



Class: Final Year B. Tech. (Electronics Engineering) Part II
Sub.: EL-III- Computer Architecture

Question bank

Section I

Questions for 4 marks (Q. 2)

1. Levels of machines in the computer hierarchy.
2. Components of Von Neumann Model architecture
3. System Bus Model
4. Address, Data, and Control bus
5. Typical Computer System
6. Fixed point number representation in detail.
7. Floating point number representation in detail.
8. Conversion of decimal to binary number.
9. Conversion of binary to decimal number.
10. Conversion hexadecimal number to decimal number
11. Conversion decimal number to hexadecimal number
12. Algorithm for Floating point addition
13. Algorithm for Floating point subtraction
14. Algorithm for Floating point multiplication
15. Algorithm for Floating point division
16. ARC RISC processor data transfer instructions
17. Hardware components of instruction set architecture
18. Functional behavior of RAM cell with diagram.
19. Normalized scientific notation with suitable example.
20. Addressing modes in ARC RISC processor.
21. Memory hierarchy in a computer system.
22. ARC RISC processor arithmetic instructions
23. ARC RISC processor logical instructions
24. Interfacing Techniques
25. Programmed IO communication method

Questions for 6 marks (Q. 3)

1. IEEE 754 standard format used to store floating point number in memory.
2. What is fetch execute cycle? Draw and explain an example of data path.
3. Explain interrupt driven IO system
4. Use of DMA and its advantages.
5. Represent decimal real number in a floating point representation with a sign bit, a 8-bit exponent, and 23 bits mantissa in a normalized notation in base 2.
6. Represent decimal real number in a floating point representation in single word precision IEE754 representation

7. Represent decimal real number in a floating point representation in double word precision IEE754 representation
8. Hardware for high performance addition
9. Hardware for high performance subtraction
10. Implementation of ripple carry adder
11. Implementation of carry look ached adder
12. Implementation of a serial multiplier for 4 bit multiplication.
13. Write the ARC processor assembly program with meaning of each instruction for addition of two eight bit numbers
14. Comparison between various communication methods
15. Comparison between various DDR memories.

Section II

Questions for 4 marks (Q. 4)

1. Main stream classes of computing environment.
2. Classes of parallelism
3. Parallel architecture- meaning, and advantages.
4. Basic structure of centralized shared memory multiprocessor based on multi core chip.
5. Explain hardware based speculation.
6. Explain the processor performance equation.
7. Explain overcoming data hazards with dynamic scheduling
8. What are the challenges of parallel processing?
9. Multiprocessor cache coherence.
10. Explain basic compiler techniques for exposing instruction level parallelism.
11. Basic compiler techniques for exposing instruction level parallelism.
12. Factors which affect the cost of computing system
13. Quantitative principles of computer design
14. How to measure and summarize the performance of computing system/
15. How to reduce branch costs with prediction?
16. Symmetric shared memory architectures
17. Distributed shared memory
18. Directory based coherence
19. Concepts and challenges in instruction level parallelism
20. Examples of dynamic scheduling

Questions for 6 marks (Q. 5)

1. The impact of time, volume, commoditization on a cost of computing system
2. What is parallel processing? Explain it with example.
3. Explain basic schemes for enforcing coherence.
4. Explain five implementation techniques which change at a dramatic pace.
5. What is instruction level parallelism? Explain data hazards.
6. Note on a cost of computing system
7. How to measure performance of symmetric shared memory multiprocessors?
8. Trends in power in integrated circuits
9. What are the trends in cost?
10. Method to exploit ILP using multiple issue and static scheduling
11. Methods of overcoming data hazards
12. Increasing Instruction Fetch Bandwidth

Machine Learning Question Bank

Short Questions

1. Explain Supervised type of learning with examples.
2. Explain Unsupervised type of learning with examples.
3. Explain Reinforcement type of learning with examples.
4. Differentiate between Learning versus Designing.
5. Explain Predictive tasks in Machine Learning.
6. Explain descriptive tasks in Machine Learning.
7. Differentiate between Deep learning vs Machine Learning.
8. What is concept of Binary Classification?
9. What is Feature in Machine Learning? Explain the different Feature types in brief.
10. Feature Construction and Transformation, Feature Selection
11. Explain the concept of Multiclass Classification.
12. Explain Regression in short.
13. Explain different types of Regression in short.
14. Explain the Neural Network Elements in short.
15. Explain Artificial Neural Network in short.
16. Explain the different Machine Learning Models in short.
17. Explain Email Spam and Malware Filtering in short.
18. Explain the Characteristics of Machine learning tasks.
19. Discuss various Examples of Machine Learning Problems.
20. Explain Multiclass Classification with examples.
21. Explain the Neural Network Elements in brief.
22. Explain the Rule Based Models.
23. Explain in detail Nearest Neighbours Classification.
24. Explain the application of machine learning as Image recognition.
25. What is Overfitting in Regression?
26. Explain VC Dimensions in brief.
27. Explain Basic Perceptron in brief.
28. Explain Least Squares method in brief.
29. Explain Regularized Regression in brief.
30. Explain Association rule mining in brief.
31. Explain the application of machine learning as Speech Recognition
32. Explain the application of machine learning as Traffic Prediction.
33. Explain Feature Construction in brief.
34. Explain Transformation in brief.
35. Explain the different elements of Decision Trees in brief.
36. Explain the Feed-Forward Network in brief.
37. Explain the Back Propagation Algorithm in brief.
38. Explain Overfitting in Regression in brief.
39. Explain Underfitting in Regression in brief.
40. Explain Neighbours and Examples in algebraic model in short.

Long Questions

1. Explain Feature Construction and Transformation in detail.
2. Explain Deep Learning in brief.
3. Differentiate between Deep learning vs Machine Learning with different parameters.
4. Explain different types of Regression in brief.
5. Explain Artificial Neural Network and its types in brief.
6. Explain the Decision Trees in detail.
7. Explain the Feed-Forward Network and Back Propagation Algorithm in brief.
8. Explain Binary Classification with examples.
9. Explain Multiclass Classification with examples.
10. Explain Overfitting and Underfitting in Regression in brief.
11. Explain Regularization theory in brief.
12. Explain Distance Based Models in brief.
13. Explain Rule Based Models in brief.
14. Explain Probabilistic Models in brief.
15. Explain Normal Distribution and Its Geometric Interpretations.
16. Explain Naïve Bayes Classifier in brief.
17. Explain Discriminative learning with Maximum likelihood in brief.
18. Explain the application of machine learning as Self-driving Cars.
19. Explain the application of machine learning as Virtual Personal Assistant.
20. Explain the application of machine learning as Medical Diagnosis.

Wireless Sensor Networks

4 marks Question

1. What are the challenges and the required mechanisms of a Wireless Sensor Network?
2. Explain the various Enabling Technologies for Wireless Sensor Networks.Mention the various applications of WSN.
3. What are the Characteristics of IEEE 802.15.4.11
4. Explain in brief any two contention based protocols.
5. Explain any one schedule based protocol.

8 marks Question

1. Explain the various hardware components of Single Node architecture.
2. Explain in detail about the Gateway concepts.
3. Write notes on any 2
   (i) Dynamic Energy and power management.
   (ii) TinyOS .
   (iii) Programming Models in WSN.
4. Explain in brief about energy Consumption of Sensor nodes.
5. Explain use of MAC Protocols in directionalAntennas.
6. Explain the classes of Contention-based senderinitiated protocols
7. What are the different system power managementschemes?
8. Explain in detail about the Gateway concepts.
9. What are the various applications of wireless sensor networks and explain any two with example.

University Question Bank for Engineering Physics

Section I

Sr. No.	3 Marks Question
1	With neat diagram explain valence band, Conduction band and Energy Gap in solids.
2	On the basis of energy band gap, classify solids as conductor, semiconductor and insulator.
3	Define and explain Fermi Dirac's distribution probability function in details.
4	Prove that Fermi level in an intrinsic semiconductor lies in the middle of the energy gap
5	Effect of impurity on Fermi level in P-type and N-type semiconductor, explain with neat diagram.
6	Define Hall Coefficient and write applications of Hall effect
7	Define the following terms: i) space lattice, ii) unit cell, and iii) Atomic Packing factor
8	Find the effective number of atoms per unit cell for SC, BCC and FCC crystals.
9	Define the following terms: i) Crystallography, ii) Unit cell, and iii) co-ordination number.
10	Define atomic radius. Find relation between atomic radius and lattice constant for SC, BCC and FCC crystals.
11	Obtain co- ordination number for SC, BCC, and FCC crystal structures with definition.
12	Calculate atomic packing factor for SC, BCC & FCC crystal structures
13	Define void space. Calculate void space for SC, BCC and FCC.
14	Define density of unit cell State density of Crystals for SC, BCC & FCC crystals
15	Define Miller indices How are they determined?
16	Explain Bragg's Law using X-ray diffraction.
17	State conditions for the acoustically good auditorium hall.
18	Define i) reverberation ii) reverberation time and iii) absorption coefficient
19	State and explain Sabine's formula for the reverberation time.
20	Explain in detail piezo-electric effect and magnetostriction effect?
21	What are ultrasonic waves? State their properties.
22	Describe various methods used for detection of ultrasonic waves
23	State applications of ultrasonic waves.
24	State and explain postulates of special theory of relativity.
25	Derive an expression of length contraction
26	Explain Time dilation phenomenon with mathematical expression.
27	Deduce Einstein's expression for mass-energy equivalence.
28	An n- type germanium sample has a donor density of $10^{21}/m^3$. It is arranged in a Hall experiment having magnetic field of 0.5 T and the current density is 500 A/m^2. Find the Hall voltage if the sample is 3 mm wide.
29	Lead is FCC with an atomic radius of r = 1.746 A^0. Find the spacing of: (i) (2 0 0) planes and (ii) (2 2 0) planes.
30	Calculate the interplanar spacing for (2 1 2) plane in a simple cube lattice where lattice constant is 4.6 A^0.
31	A hall has a volume of 6500 m^3. It is required to have reverberation time of 2.5sec.What should be the total absorption in the all?
32	If the total energy of a particle is exactly thrice its rest energy, what is the velocity of the particle?

Sr. No.	5 Marks Question
1	What is Hall Effect? Derive the relation for Hall voltage and Hall coefficient.
2	Explain the term Miller indices. Derive the relation between lattice constant and interplaner spacing for cubic crystal.
3	Explain the factors affecting the architectural acoustics and their remedies.
4	Deduce the expression for Lorentz transformation equations and its inverse.
5	Define Hall effect? Obtain an expression for Hall voltage and Hall coefficient. State any two applications of Hall effect.
6	Show that in a cubic crystal the spacing between consecutive parallel planes of miller indices (hkl) is given by $d = a / (h^2+k^2+l^2)^{1/2}$.
7	A copper specimen having length 1 meter, width 1 cm and thickness 1mm is conducting 1 amp current along its length and is applied with a magnetic field of 1 Tesla along its thickness. It experiences Hall effect and a hall voltage of 0.074 microvolts appears along its width. Calculate the Hall coefficient and the mobility of electrons in copper. (Conductivity of copper is $\sigma = 5.8 \times 10^7$ (Ωm^{-1})
8	Copper has FCC structure and atomic radius is 1.278 A^0. Calculate its density. Given: Avogadro number = 6.02×10^{26} /kg.mol and M = 63.54.
9	The volume of a hall is 475 m^3. The area of wall is 200 m^2, area of floor and ceiling each is 100 m^2. If absorption of the wall, ceiling and floor are 0.025, 0.02 and 0.55 respectively. Calculate the reverberation time for the hall.
10	The rest mass of an electron is 9.1×10^{-28} gm. What will be its mass of it were moving with $(4/5)^{th}$ the speed of light.
11	What is meant by symmetry elements in a crystal? Discuss the various types of symmetry elements and symmetry operations present in a cubic crystal.

University Question Bank for Engineering Physics

Section II

Sr. No.	3 Marks Question
1	With neat diagram, state and explain Rayleigh's criterion of resolution.
2	Explain theory of transmission diffraction grating to calculate wavelength of light.
3	Define resolving power of an optical instrument. Derive an expression for the resolving power of a plane diffraction grating.
4	What is Diffraction grating and grating element, explain in detail.
5	Define the terms: i) Plane polarized light ii) Optic Axis
6	Distinguish between positive and negative crystals.
7	Explain the terms optical activity and specific rotation.
8	Write a short note on: Malus law.
9	Explain with neat diagram stimulated absorption, spontaneous emission, stimulated emission.
10	Define: i) Population inversion, ii) Pumping and iii) Metastable state.
11	Write a note on: Holography and its uses.
12	State properties of LASER beam.
13	What is holography? Explain the construction and reconstruction of hologram with neat diagram
14	State applications of laser beam in various fields.
15	Define the following terms: i) LASER, ii) Pumping, and iii) Population Inversion
16	Explain with neat diagram: Stimulated absorption and Stimulated emission of radiation.
17	With neat diagram, explain basic concept and structure of optical fiber.
18	Distinguish between stimulated absorption and stimulated emission of radiation
19	Distinguish between spontaneous emission and stimulated emission of radiation
20	Define the terms: i) Acceptance angle, ii) Acceptance cone and iii) Fractional refractive index change
21	Explain the terms: i) Total Internal Reflection, ii) Critical angle and iii) Numerical Aperture
22	With neat diagram, classify optical fibers.
23	State advantages of optical fiber cables over the conducting cable.
24	Explain De-Broglie hypothesis of matter waves.
25	Explain matter waves. State the expressions of De Broglie wavelength in terms of kinetic energy and thermal equilibrium.
26	Explain with diagram types of carbon nano tubes.
27	Write down applications of nano materials.
28	State principle of working of optical fiber. Draw labeled cross sectional view of an optical fiber.
29	Grating has 15 cm of the surface ruled with 6000 lines/cm, what is the resolving power of the grating in the first order.
30	Calculate the rotation produced by plane of polarization, if specific rotation is 66^0. Length of tube is 200 mm and concentration of sugar solution is 20 %.
31	Calculate the numerical aperture and acceptance angle for an optical fiber with core and cladding refractive indices being 1.48 and 1.45 respectively.
32	An optical fiber has the following characteristics. Fiber index n_1=1.36 and Δ=0.025. Calculate the value of NA and acceptance angle.

Sr. No.	5 Marks Question
1	What is optical activity? Explain the construction and working of Laurent's Half Shade Polarimeter.
2	Explain in detail the construction and working of He-Ne laser.
3	Obtain the expression for acceptance angle, NA and fractional refractive index change of an optical fiber.
4	Explain in detail Davisson-Germer experiment.
5	With neat energy and transition diagram, explain He-Ne gas laser.
6	Explain acceptance angle, acceptance cone, NA and relation between fractional refractive index change in details.
7	A plane transmission grating having 6000 lines per inch is used to obtain spectrum of light from sodium source is the 1^{st} order. Find the angular separation between the sodium lines whose wavelengths are 5890 Å and 5896 Å respectively.
8	An optical fiber has a NA of 0.20 and a cladding refractive index of 1.59. Determine the acceptance angle for the fiber in water which has a refractive index of 1.33.
9	Explain apparatus investigation and analysis of Davisson Germer Experiment.
10	Find the velocity and kinetic energy of a neutron with a De Broglie wavelength of 0.30 nm. Given $h=6.634 \times 10^{-34}$ J.s and $m=1.67 \times 10^{-27}$ kg

COMPUTER NETWORKS

QUETIONARY

4 Marks Questions

1. Compare OSI reference model with TCP/IP protocol suite.
2. Explain logical address in detail.
3. Explain Physical address in detail.
4. Explain Post address and Application specific address in detail.
5. Describe the NAT.
6. Write a short note on user datagram
7. Explain encapsulation & decapsulation in UDP with diagram
8. Write a short note on “Queuing” in UDP
9. Explain TCP services.
10. Explain TCP features.
11. Explain different types of TCP timers.
12. Write a short note on Concurrency.
13. Write a short note on Socket System Call
14. Explain simplified version of socket structure in detail.
15. Describe DHCP and explain need of DHCP.
16. What is Resolution in DNS?
17. Explain NVT with diagram
18. What is MTA? Explain formal protocol which defines the MTA client and server in the
19. Write a short note on Out-of-band signaling
20. Explain the messages used in TFTP.
21. Explain Dynamic Web Document.
22. Explain POP3 with its modes.

23. Explain need for DN
24. S also explain DNS in the Internet with suitable example.
25. Write a short note on Error control in TCP
26. Write a short note on Flow control in TCP
27. Write a short note on Congestion Control in TCP
28. Explain each and every module of UDP package in detail.
29. Describe the Classless Addressing.
30. Describe the Special Addressing.
31. Explain Post address and Application specific address in detail.

8 Marks Questions

1. Explain layers in TCP/IP protocol suite in detail with neat diagram.
2. Explain layers in OSI reference model in detail with neat diagram.
3. What is Three-way handshaking in TCP?
4. Draw State Transition diagram of TCP in detail.
5. Explain Connection–Oriented concurrent server in detail.
6. Explain Connectionless Iterative server in detail.
7. What is FTP? Explain connection in FTP.
8. Explain different domain name space sections of DNS in the internet.
9. Explain client state transition diagram of DHCP.
10. Explain Email architecture with its four scenarios.
11. Explain address allocation in DHCP. Draw DHCP client State transition diagram.
12. Explain connection in TFTP.
13. Explain need for DNS also explain DNS in the Internet with suitable example.

14. What is IP Datagram? Explain with a neat diagram.
15. What is fragmentation? Explain with a neat diagram.
16. Explain in detail pseudo header for checksum calculation with a neat diagram.
17. Explain the connection establishment in TCP connection using three way hands shaking.
18. Explain the different Associations of SCTP.
19. Explain the state transition diagram of SCTP in detail.
20. Write a TCP client-server Program.

Advanced Mobile Communication
Question Bank

Class: TY **Sem II** **A.Y:2021-22**

Q. No.	Questions
1	What is cellular concept? Explain it briefly.
2	What is Frequency Reuse? Explain about channel assignment strategies
3	What is Handoff? Explain different types of Handoffs?
4	What is cell splitting? Explain.
5	What is trunking and grade of service?Explain.
6	What is interference? Explain different types of Interference.
7	Explain practical link budget design using path loss model in detail.
8	Explain flat fading and frequency selective fading in detail.
9	Explain practical link budget design using path loss model in detail.
10	Derive an expression for Free space propagation Model.
11	Derive an expression for Two ground reflection Model.
12	TDMA multiple access technique for cellular system.
13	Write a short note on multiple access technique for cellular system
14	FDMA multiple access technique for cellular system
15	SSMA multiple access technique for cellular system.
16	Write comparison between FDMA,TDMA,FHMA AND SSMA.
17	SSMA multiple access technique for cellular system.
18	Explain GSM frame structure.
19	Explain GSM architecture.
20	Explain GSM common control and dedicated control channels.
21	Explain authentication and equipment identification register in GSM..
22	Explain mobile call origination sequences in GSM.
23	Explain different types of handoff in GSM.
24	Draw and explain GPRS transmission plane protocol.

25	Explain forward link and reverse link structure in IS-95 CDMAA system.
26	Discuss different service aspects of IS-95 CDMA system.
27	Brief explanation on reverse link structure in IS-95 CDMA system.
28	Explain packet and frame formats in IS-95 CDMA system
29	Describe handoff and power control in 3G system
30	Explain forward and reverse channel in CDMA 2000
31	Describe an architecture of 4G/LTE.
32	What are LTE channels.Explain
33	Describe an architecture of 5G.

Optical Communication Question Bank

Short Questions

1. Explain the principle operation / concept of double heterojunction LED.
2. With B.D., Explain optical fiber communication system briefly.
3. With energy state diagram explain working of laser.
4. Explain structure of surface emitting LED.
5. Explain the various characteristics of LED.
6. Write a note on Edge emitting LED.
7. Explain the following terms:
   a. Quantum Efficiency b. Responsivity
8. Explain the concept of silicon reach through Avalanche Photodiode.
9. Explain the various parameters effecting the speed of response of detectors.
10. Explain the principle of p-i-n photodiode.
11. Explain EDFA.
12. Using simple ray theory, describe the mechanism for the transmission of light within an optical fiber.
13. Explain Critical angle in brief.
14. Explain Snell's law in brief.
15. Explain Refractive Index in brief.
16. Explain Acceptance angle in brief.
17. Explain the different types of rays in optical fiber.
18. Comparison between step index fiber and graded index fiber
19. Explain intrinsic absorption mechanism in fiber optics.
20. Explain extrinsic absorption mechanism in fiber optics.
21. Explain the advantages and disadvantages of LED.
22. Explain scattering losses observed in fiber optics.
23. What is dispersion? Compare dispersions in different types of fiber optics.
24. Briefly write about intramodal disposition occurred in fiber optics.
25. Briefly write about non-linear scattering losses observed in fiber optics.
26. What is dispersion? Compare dispersions in different types of fiber optics
27. Explain intrinsic and extrinsic absorption mechanism in fiber optics.
28. Define relative refractive index difference for an optical fiber and show how it may be related to the numerical aperture.
29. Explain about requirement of optical cable design.
30. Explain vapour phase deposition technique for preparing fiber optics.
31. Define Dispersion. Explain the technique for Multimode Fiber Dispersion measurement in the time domain.
32. Briefly write about connectors of fiber optics.
33. What are splices? Explain techniques for splicing.
34. Write a short note on WDM.
35. Explain SONET/SDH rings
36. Explain types of Optical Amplifiers
37. Explain the transmitter design for optical communication.
38. Explain OTDM.
39. Explain the different types of optical fibers.

40. Explain the different types of dispersion.
41. Briefly write about joint losses in optical fiber.
42. Explain any one method for fiber dispersion measurement.
43. Compare linear and non-linear scattering mechanism in fiber option.
44. Explain the different types of scattering mechanism.
45. Explain the applications of optical communication.
46. Briefly write about alignment losses.
47. Explain various characteristics of LED.
48. Explain Rayleigh scattering loss in optical fiber.
49. Explain the benefits and drawbacks of avalanche photodiode.
50. Explain the operation of Optical TDM. What are its advantages over Electrical TDM?

Long Questions

1. An optical fiber has a numerical aperture of 0.20 and a cladding refractive index of 1.59. Determine
   a. The acceptance angle for the fiber in water which has a refractive index of 1.33
   b. The critical angle at the core-cladding interface.

   {Ans: a) θa=8.6°, b) Øc=83.6°}
2. An optical fiber has a core refractive index of 1.50 and a cladding refractive index of 1.47. Determine
   a. Critical angle at the core cladding interface
   b. NA for the fiber
   c. Acceptance angle

   {Ans: a) Øc=78.5°, b) NA= 0.30, C) θa =17.4°}
3. Explain fiber alignment and joint loss with Fresnel reflection.
4. A long single mode optical fiber has an attenuation of 0.5 dB km^{-1} when operating at a wavelength of 1.3 μm. The fiber core diameter is 6 μm and the laser source bandwidth is 600 MHz. Compare the threshold optical powers for stimulated Brillouin and Raman scattering within the fiber at the wavelength specified.

   {Ans: a) P_B = 80.3mW, b) P_R=1.38W}
5. A step index fiber in air has a numerical aperture of 0.16, a core refractive index of 1.45 and a core diameter of 60 μm. Determine the normalized frequency for the fiber when light at a wavelength of 0.9 μm is transmitted. Further estimate the number of guided modes propagating in the fiber.

   (Ans: V (Normalized frequency) =33, M (No. of guided modes) =561)
6. An 11 km optical fiber link consisting of optimum near parabolic profile graded index fiber exhibits rms internal pulse broadening of 346 ps over its length. If the fiber has a relative refractive index difference of 1.5%. Estimate core axis refractive index and numerical aperture of the fiber.

   (Ans: =1.45, NA=0.25)
7. The velocity of light in the core of step index fiber is 2.01× m/s and critical angle at core cladding interface is 80°. Determine the numerical aperture and acceptance angle for the fiber in air, assuming it has core diameter suitable for the consideration by ray analysis. The velocity of light in vacuum is 2.998×10^8 m/s.

(Ans: NA= 0.263, θa=15.2°)

8. A 15 km optical fiber link uses fiber with loss of 1.5 dB/km. The fiber is jointed every kilometer with connectors which give an attenuation of 0.8 dB each. Determine the minimum mean optical power which must be launched into the fiber in order to maintain a mean power level of 0.3 μW at the detector.

(Ans: Pin= 703 μW)

9. The mean optical power launched into an optical fiber link is 1.5 mW and the fiber has an attenuation of 0.5 dB/km. Determine the maximum possible link length without repeaters when the minimum mean optical power level required at the detector is 2 μW.

(Ans: L= 57.5 km)

10. The threshold optical powers for stimulated Brillouin and Raman scattering in a long 8 μm core diameter single mode fiber are found to be 190 mW and 1.70 W respectively when using an injection laser source with a bandwidth of 1 GHz. Calculate the operating wavelength of the laser and the attenuation in decibels per kilometer of the fiber at this wavelength?

(Ans: λ=1.50 μm, αdB=0.30 dB/km)

11. A silica multimode step index fiber has a core refractive index of 1.46. Determine the optical loss in decibels due to Fresnel reflection at a fiber joint with:
    a. A small air gap
    b. An index matching epoxy which has a refractive index of 1.40.

(Ans: (a) 0.31 dB (b) 3.8 × 10^-4 dB)

12. A silica optical fiber with core diameter large enough to be considered ray theory analysis has a core refractive index of 1.50 and a cladding refractive index of 1.47. Determine
    a. The critical angle at the core-cladding interface.
    b. The NA for the fiber.
    c. The acceptance angle in air for the fiber.

(Ans: Øc = 78.5° NA = 0.30, θa = 17.4°)

13. A planar LED is fabricated from gallium arsenide which has a refractive index of 3.6
    a. Calculate the optical power emitted into air as a percentage of the internal optical power for the device when the transmission factor at the crystal-air interface is 0.68.
    b. When the optical power generated internally is 50% of the electrical power supplied, determine the external power efficiency.

(Ans: a) Pe =0.013Pint (b) ηep= 0.65%)

14. The phototransistor has a collector current 15 mA when the incident optical power at wavelength of 1.26 μm is 125 μW. Estimate optical gain of device, the common emitter current gain if the quantum efficiency of the base–collector photodiode at a wavelength of 1.26 μm is 40%.

(Ans: G0=118.1, hFE= 295.3)

15. The radiative and non-radiative recombination lifetimes of the minority carriers in the active region of a double-heterojunction LED are 60 ns and 100 ns respectively. Determine the total carrier recombination lifetime and the power internally generated within the device when the peak emission wavelength is 0.87 μm at a drive current of 40 mA.

(Ans: τ =37.5 ns, ηint = 0.625 , Pint = 35.6 mW)

16. With suitable sketches explain working principle of LASER.

17. Write a short note on ‘Optical Amplifiers’.
18. Explain SONET and SDH networks, rings.
19. Write a short note on semiconductor optical amplifiers.
20. Explain in detail the receiver design for optical communication.
21. Write and explain various advantages of fiber optic.
22. Define and explain the absorption coefficient, Responsivity and quantum efficiency of optical detectors.
23. Briefly explain how numerical aperture is measured in optical fiber.
24. Explain in detail working of phototransistor.
25. Explain any two methods of mechanical splicing techniques used for splicing single optical fibers

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Punyashlok Ahilyadevi Holkar Solapur University,Solapur

Department Of Electrical Engineering

Class :- Final Year B. Tech. (EE) Sem-I

Subject : POWER SYSTEM AND OPERATION CONTROL

Question Bank (PSOC)

1. Explain with mathematical formulation the economic load dispatch neglecting transmission losses.
2. Explain heat rate curve and cost curve of thermal power plant.
3. Explain the following
   a) Incremental fuel cost
   b) Incremental production cost
4. Explain with mathematical formulation the economic load dispatch including transmission losses
5. Explain with mathematical formulation the economic load dispatch including transmission losses and penalty factor
6. Write a short note on hydrothermal scheduling.
7. Write a short note on spinning reserve
8. Explain the term unit constraint.
9. What is mean by unit commitment? Explain the necessity of it.
10. What are the different methods of unit commitment ?Explain the priority list method for unit committment with suitable example
11. Explain the priority list method for unit commitment with suitable example.
12. Explain the necessity of keeping the frequency constant in power system.
13. Give the advantages and dis-advantages of different types of compensating equipment for transmission system.
14. Explain the load frequency control of single area system with neat diagram.
15. Explain the necessity of power system security.
16. Explain with illustrative transfer function of the load frequency control of two area system.
17. Explain with illustrative transfer function of speed governing system
18. The fuel cost of two units are given by

    $C_1 = 0.1\ P^2 G_1 + 25\ PG_1 + 1.6$ Rs./hr

    $C_2 = 0.1\ P^2 G_2 + 32\ PG_2 + 2.1$ Rs./hr

    If the total demand on the generators is 250 MW, find the economical load distribution of the two units
19. Explain reactive power compensation in power system.
20. Explain Specifications of Load compensator.
21. Give the advantages and dis-advantages of different types of compensating equipment for transmission system.
22. What is mean by load compensation? Explain briefly.
23. What is mean by load compensation? Explain.
24. Explain the load frequency control of single area system with neat diagram.
25. Give the specification of load compensator.
26. Explain system state classification with neat diagram

27. Give the difference between voltage angle and voltage stability.
28. Give the difference between voltage angle and voltage stability.
29. Explain the following
    a) Reactive power flow
    b) Voltage collapse
30. Explain compensation of reactive power in power system in detail
31. Derive the expression for voltage stability problem.
32. Explain the different methods of improving voltage stability
33. How to prevent voltage collapse problem? Explain
34. Explain the thermal unit constraint.
35. Describe the need of economic dispatch.
36. What is spinning reserve?
37. Explain classification of system states.
38. What is mean by load compensation? Explain briefly.
39. Explain the difference between Voltage angle and voltage stability.
40. Why reactive power compensation required in power system?
41. Explain power system voltage stability.
42. What are the different methods for prevention of voltage collapse?
43. What do you mean by security analysis? Explain briefly.
44. Explain compensation of reactive powerin power system in detail.
45. With neat sketch explain turbine speed governing system.
46. With neat sketch explain Heat Rate Curve and cost curve of Thermal power plant.
47. Explain The different Thermal unit constraints.
48. What is meant by Unit commitment? Explain the necessity of it.
49. Explain Speed governing system with neat sketch.
50. Explain with illustrative transfer function of the load frequency control of single area system . Draw the block diagram for single area system.
51. Explain the different methods of improving voltage stability.
52. Explain the Specifications of load compensator.
53. What do you mean by Load Frequency Control ?
54. What is meant by control area and ACE?
55. Which are the different Unit commitment solution methods?
56. What are the different type of static VAR compensators?
57. What are the objectives of automatic generation control?
58. What is the function of load frequency control?
59. Define the following:
    (a) Hot reserve (b) cold reserve (c) spinning reserve
60. Distinguish between economic dispatch and unit commitment?
61. Define state estimation.
62. What do you mean by power system security?

Question Bank

Subject-Civil
(Elective III Air Pollution and Noise Control) for Class-B Tech II Sem VIII
(w.e.f. Nov. .2021) New CBCS

1.	Explain with neat sketch the " Structure of Atmosphere" (5 marks)
2.	What are the types and sources of particulate matter causing air pollution, Briefly Explain.(4 marks)
3.	Identify the various sources of air contaminants (5 marks) a) Sulphur Dioxide b) Carbon monoxide c) Oxides of nitrogen d) Hydrocarbons
4.	Distinguish Between Primary and secondary Pollutants. (4 marks)
5.	Distinguish between Stationary and mobile sources of Air pollution. (4 marks)
6.	List out the meterological factors influencing air pollution (5 marks)
7.	Explain the role of meterological elements in the dispersion of air pollutants in the atmosphere (5 marks)
8.	Explain the causes and effects of inversion of atmosphere. (5 marks)
9.	With the help of neat sketches, explain the working of Wind Speed recorder. (5 marks)
10.	With the help of neat sketches, explain the working of Wind direction recorder. (5 marks)
11.	Explain the terms (7 marks) • Environmental Lapse Rate • Adiabatic Lapse rate • Wind Rose
12.	Describe with neat sketches how different atmospheric condition give rise to different kinds of Plumes. (7 marks)
13.	Write a short note on Dispersion Models. (4 marks)
14.	Write a short note on Stack Height (4 marks)
15.	Explain the factors to be considered for industrial- Plant Location. (7 marks)
16.	Explain the importance of proper planning and zoning of industrial and residential areas from the point of air pollution control. (7 marks)
17.	What are the harmful effects of polluted air on Human Being. (5 marks)
18.	What are the harmful effects of polluted air on Plants. (5 marks)
19.	Explain the Mechanism of deterioration in polluted Atmospheres. (5 marks)
20.	Explain the financial losses due to air pollution.(5 marks)
21.	Explain with neat diagram the procedure of High Volume Sampler. (7 marks)
22.	Write a short note on Air- Fuel Ratio. (5 marks)
23.	Explain the theory of Formation of Photo Chemical Smog. (5 marks)
24.	What are the factors affecting Photochemical reactions.(5 marks)
25.	Explain with neat Sketch, Principle and working operation of settling Chamber. (5 marks)
26.	Explain with neat Sketch, Principle and working operation of Inertial Separator. (5 marks)
27.	Explain with neat Sketch, Principle and working operation of Cyclone Separator. (5 marks)
28.	Explain with neat Sketch, Principle and working operation of Fabric Filter. (5 marks)
29.	Explain with neat Sketch, Principle and working operation of Electrostatic Precipitator. (5 marks)

30.	Explain with neat Sketch, Principle and working operation of Spray Tower. (5 marks)
31.	Write advantages and disadvantages of Bag Filter. (5 marks)
32.	Write advantages and disadvantages of Cyclone Separator. (5 marks)
33.	Write short note on Bag Filter. (5 marks)
34.	Write short note on Electrostatic Precipitator. (5 marks)
35.	Explain with neat diagram for measurement of smoke using Ringelmann Chart. (5 marks)
36.	Describe the standards and its characteristics of Noise. (5 marks)
37.	Explain the various sources and its effects of Noise pollution. (7 marks)
38.	Write a short note on measurements of noise Pollution. (5 marks)
39.	Explain the basic concepts of acoustics of sound. (5 marks)
40.	Write Short note on sound power and sound pressure. (5 marks)

Question Bank

Design of Steel Structures

Class-B Tech III Sem V (w.e.f. June.2020) CBCS

Q1) What are the advantages and disadvantages of steel as a structural material.

Q2) Explain the anatomy of structure

Q3) State the physical and mechanical properties of steel as a structural material

Q4) Explain stress-strain curve for mild steel

Q5) Explain design philosophy of steel structure

Q6) Explain the principles of limit state design

Q7) Explain the advantages and disadvantages of bolted connections

Q8) Explain failure of bolted joints

Q9) Classify the following section as per codal provisions

a) ISLB 300@37.7 kg/m

b) ISHB 200@37.3 kg/m

c) ISLB 350@486 N/m

d) ISHB 400@77.4 kg/m

e) ISA 100 x 100 x 6 @9.2 kg/m

Q10) A section is fabricated from plates of 10 mm thickness to form an 'I' section both flanges are 400 mm x 10 mm, the web is 500 x 10 mm, so that the total depth is 520 mm. find the effective area of cross section if it is used as

a) Axially loaded column

b) Laterally loaded column

Q11) The loads on a floor beam of a commercial building are as below

Roof loads

Dead load = 7 kN/m^2

Live load = 3 kN/m^2

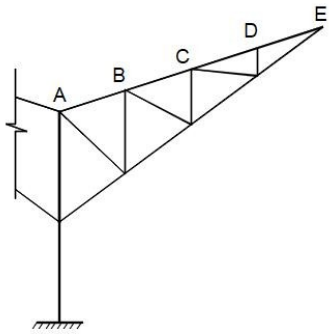
Roof finish = 1.75 kN/m^2

Determine the design load for

a) Limit state of strength

b) Limit state of serviceability

Q12)



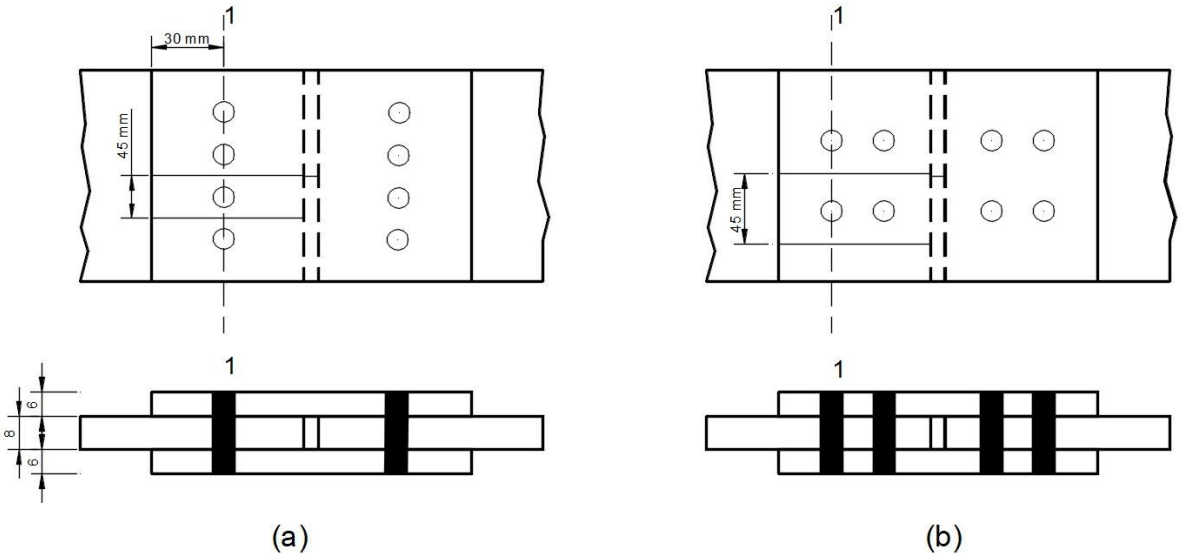
The member force in the principal tie of a butterfly roof truss are as follows

Member	**Due to dead load (Tension) kN**	**Due to wind load (Tension) kN**
AB	26.6	46.9
BC	18.6	32.0
CD	9.5	16.8
DE	9.0	15.0

Determine the design load for the principal Tie

Q13) A single bolted double cover butt joint is used to connect two plated which are 8 mm thick assuming 16 mm diameter bolts of grade 4.6 and cover plates to be 6 mm thick, calculate the strength and efficiency of the joint, if 4 bolts are provided in the bolt line at a pitch of 45 mm as shown in fig.

Also determine the efficiency of the joint if two lines of bolts with two bolts in each line have been arranged to result in a double-bolted double cover butt joint.



Q14) A lap joint is made with four M20 bolts for 8 mm thick plates determine

i) Maximum and minimum edge and end distance

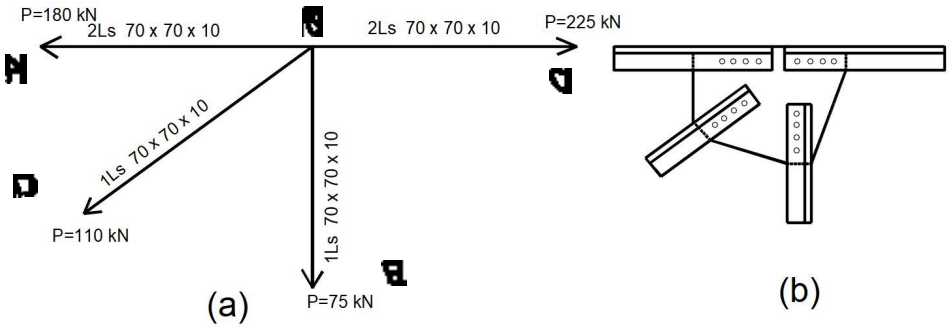
ii) Maximum and minimum pitch and gauge distance for the bolted joint

Take fy = 310 Mpa.

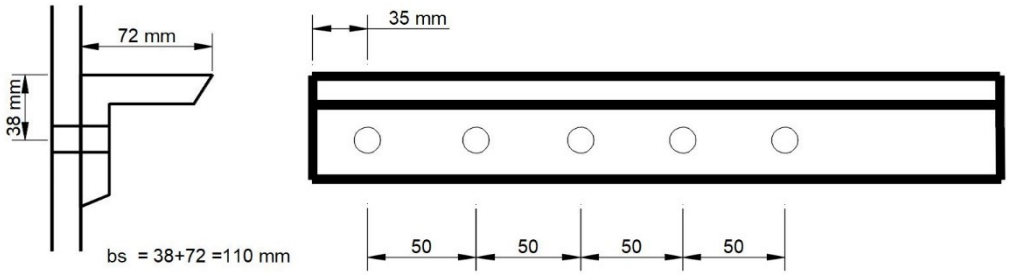
Q15) A lap joint is made between two plates of 10 mm thickness with 6 numbers of 16 mm black bolts (G- 4.6) in two rows. Find the joint capacity. Bolts are fully threaded.

Q16) Design joint B of a roof truss as shown in fig.

i) The members are connected with 16 mm diameter bolts of grade 4.6 to the gusset plate of 12 mm thick.



Q17) Calculate the maximum tension allowed on a single angle ISA 75 x 75 x 6 if it is connected on one side of gusset plate of 8 mm thick with bolts of 20 mm diameter. Bolt strength is 43 kN per bolt. End distance is 35 mm and pitch of bolt is 50 mm



Q18) An ISA 75 x 75 x 6 is to be fastened on to one side of a gusset plate of 8 mm thick. Design a bolted connection

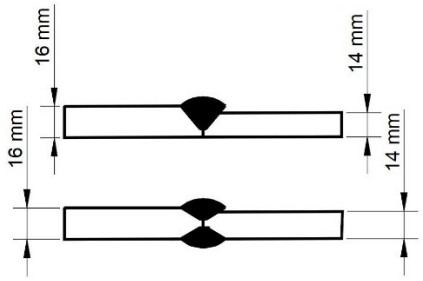
Q19) Explain the advantages and disadvantages of welded connections

Q20) Two plates of 16 mm and 14 mm thickness are to be joined by a groove weld as shown in fig. The joint is subjected to a factored tensile force of 430 kN. Due to some reasons the effective length of the weld that could be provided was 175 mm only. Check the safety of the joint if

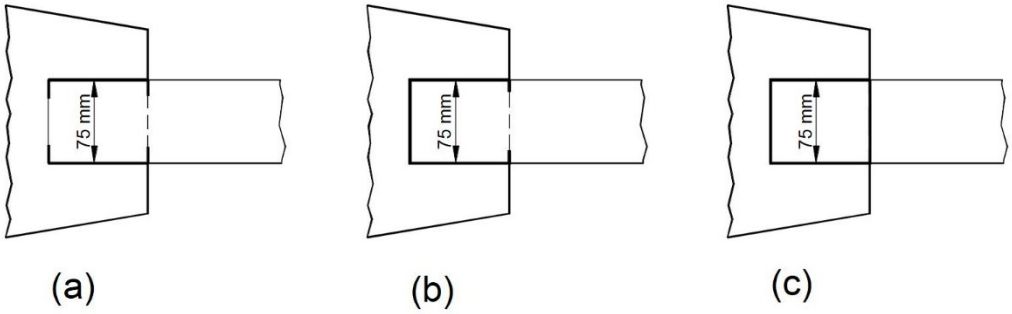
a) Single V-Groove weld is provided

b) Double V-Groove weld is provided

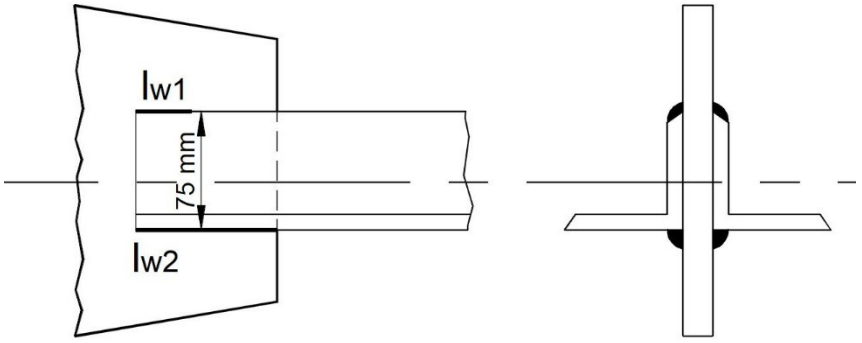
Assume the plates to be shop welded



Q21) A 75 mm x 8 mm tie member is to transmit a factored load of 145 kN. Design fillet welds and necessary overlaps for the case as shown in fig. The steel used is of grade Fe 410 assume gusset plate to be 12 m thick.



Q22) A tie member of a truss consists of double angle section each 80 mm x 80 mm x 8 mm welded on the opposite side of a 12 mm thick gusset plate as shown in fig. Design a fillet weld for making the connection in the workshop. The factored tensile force in the member is 300 kN.



Q23) A tie member consists of two ISMC 250. The channels are connected on either side of a 12 mm thick gusset plate. Design the welded joint to develop the full strength of the tie. However, the overlap is to be limited to 400 mm.

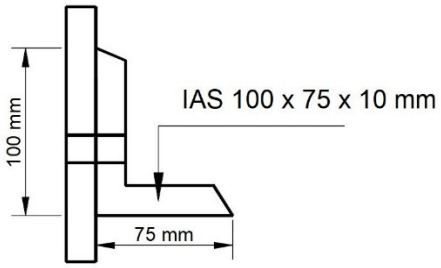
Q24) State the advantages and disadvantages of bolted connections

Q25) Define

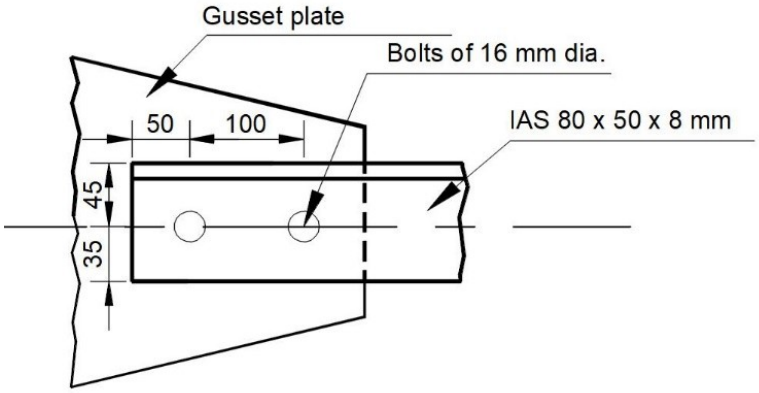
a) Pitch of bolts and state its minimum value and maximum value
b) Gauge distance and state its minimum value and maximum value
c) Edge distance and state its minimum value and maximum value
d) End distance and state its minimum value and maximum value
e) Tacking bolts or rivets

Q26) Explain failure of bolted joints

Q27) Determine the effective net area of the angle section as shown in fig. the angles are connected with 18 mm dia. Bolts of grade 4.6. the steel is of grade Fe410 assume bolts are punched



Q28) Determine the block shear strength of the tension member as shown in fig. The steel is of grade Fe410



Q29) A tension member 0.95 m long is to resist a service dead load of 30 kN and a service live load of 70 kN. Design a rectangular bar of standard structural steel of grade Fe410. Assume that the member is connected by one line of 16 mm dia. Bolts of grade 4.6.

Q30) Determine the tensile strength of 2 ISA 90 x 60 x 8 connected to gusset plate of 12 mm thick by 8 numbers of M16 bolts of grade 4.6. the longer leg is connected to gusset plate if

a) Angle are placed on opposite side of gusset plate (tack bolted)

b) Angles are placed on same side of gusset plate (tack bolted)

The following is the data of connection

i) Number of bolts = 8 nos

ii) Pitch of bolts = 40 mm

iii) Edge distance of bolt = 30 mm

iv) Grade of steel =Fe410

Q31) Design a tension member using double unequal angle section back-to-back on opposite side of gusset plate 10 mm thick. Which carries an axial factored load of 400 kN using 20 mm black bolts. Assume Fe410 grade steel fy = 250 Mpa and also show design details

Q32) Design a tie of a roof truss subjected to factored design force 250 kN using unequal angle section. The center to center of intersection is 2.5 m. Also design welded connection and draw the design details use fy = 250 Mpa and Fe 410

Q33) Design double angle section back-to-back on each side of gusset plate 8 mm thick for continuous principal rafter of a truss to carry factored load of 250 kN. The center-to-center length of member between centroids of connection is 2.5 m. Also design the connection for

a) Bolted connection
b) Welded connection

Q34) Design a built-up column comprising two rolled steel 'I' sections to resist factored axial compressive load of 4000 kN. Length of column is 5 m restrained in direction at both ends, restrained in position at base but not in position in ZZ direction use fy = 250 MPa. Also design a suitable lacing system.

Q35) Design a built-up column consisting of two channels placed back-to-back and carrying a factored axial load of 1600 kN. The length of column is 8 m. It is effectively held in position at both ends and restrained against rotation at one end use steel Fe410 with fy = 250 MPa. Also design the battening system.

Q36) Design a single angle discontinuous strut to carry a factored axial compressive load of 70 kN. The length of strut is 3 m between intersections. It is connected by 12 mm thick gusset plate by 20 mm dia. 4.6 grade bolts use steel of grade Fe410 and fy = 250 N/mm^2 assume the ends to be fixed

Q37) Determine the design bending strength of ISLB 350@486 N/m consider the beam to be

a) Laterally supported
b) Laterally unsupported

The design shear force V is less than the design shear strength. The unsupported length of the beam is 3.0 m assume steel of grade Fe410

Q38) Design a laterally supported beam of effective span 6 m for the following data

Grade of steel = Fe410

Maximum bending moment = 150 kN-m

Maximum shear force = 210 kN

Check for deflection is not required

Q39) Design a simply supported beam of effective span 1.5 m carrying a factored concentrated load of 360 kN at mid span

Q40) Design an 'I' section purlin, for an industrial building situated in the outskirts of Pune to support a galvanized corrugated iron sheet roof for the following data

a) Spacing of the truss C/C = 6.0 m
b) Slope of truss = 30^0.
c) Span of truss = 12 m
d) Spacing of purlins C/C/ = 1.6 m
e) Intensity of wind pressure = 1.8 kN/m^2
f) Weight of galvanized sheet = 130 N/m^2
g) Grade of steel Fe 410

Q41) Symmetric trusses of span 20 m and height 5 m are spaced at 4.5 m center to center. Design channel section purlins to be place at 1.4 m distance to resist the following loads

a) Weight of sheeting including bolts = 171 N/me
b) Live load = 0.4 kN/m^2
c) Wind load = 1.2 kN/m^2 suction

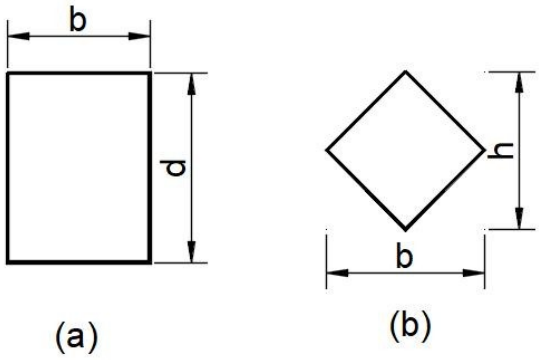
Q42) Design a slab base for a column ISHB 350@710.2 N/m subjected to a factored axial compressive load of 1500 kN for the following conditions

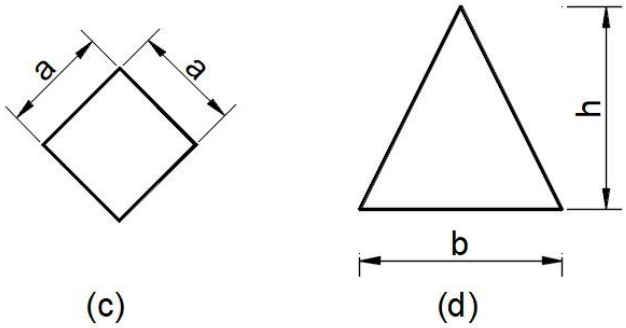
a) Load is transferred to the base plate by direct bearing of column flanges
b) Load is transferred to the base plate by welded connections; the column end and the base plate are not machined for bearing

State whether anchor bolts are required. The base rests on concrete pedestal of grade M20

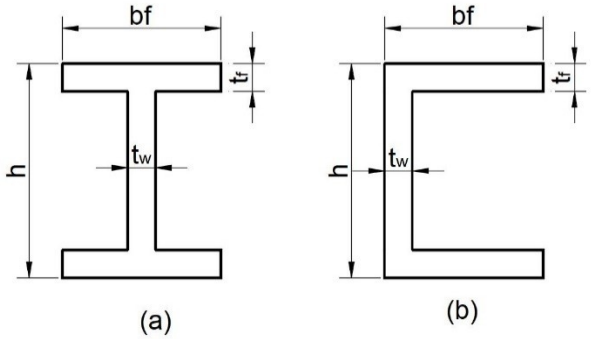
Q43) A column ISHB 350@661.2 N/m carries an axial compressive factored load of 1700 kN. Design a suitable bolted gusset base. The base rests on M15 grade concrete pedestal. Use 24 mm diameter bolts of grade 4.6 for making the connections

Q44) Find the shape factor for the following sections

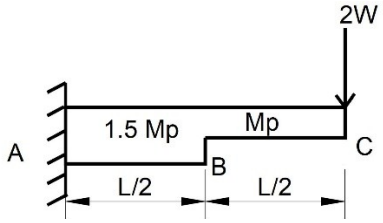




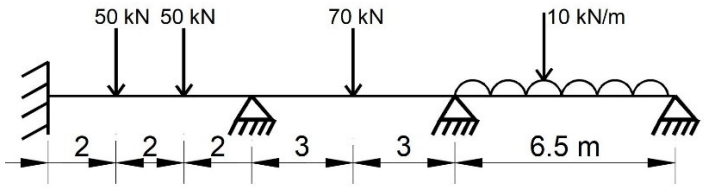
Q45) Determine the plastic section modulus about the strong and weak axis in the following cases



Q46) Find the collapse load for the cantilever as shown in fig.

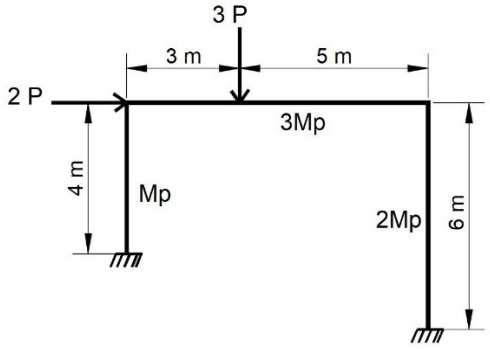


Q47) Find the design load for a continuous beam ABCD with service loads as shown. The load factor may be assumed to be 1.7

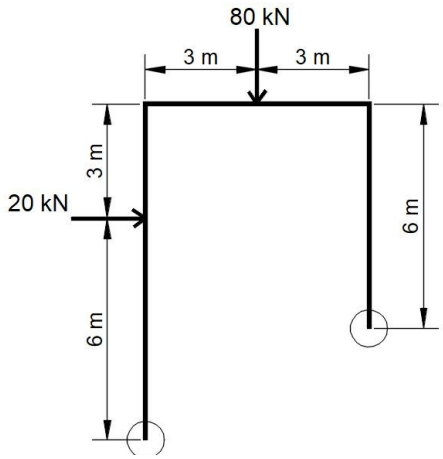


Q48) Explain complete, partial and over complete collapse

Q49) An unsymmetrical rectangular frame is loaded as shown in fig. analysis the frame for collapse load and draw the bending moment diagram



Q50) Fid out the plastic moment for a given frame of uniform cross section under applied factored loads as shown in fig



T. Y. B. Tech. (Electronics and Telecommunication Engineering)
Microcontrollers & Applications

Q.2. Solve any four:

i. Differentiate between CISC and RISC Microcontroller.
ii. Differentiate between Harvard and Van-Neumann architecture.
iii. Draw and explain Program Status Word of 8051.
iv. Explain internal RAM of 8051.
v. Differentiate between Microprocessor and Microcontroller.
vi. Write an ALP or C program to transfer 'A' serially and continuously at a baud rate of 9600.
vii. Write an ALP or C program to generate square wave of 10 ms using timer0 in mode1 assume crystal oscillator frequency of 11.0592 MHz.
viii. Interface LED to 8051. Write an ALP or C program to toggle the LED continuously after every 100 ms.
ix. Interface DAC0808 to 8051. Write an ALP or C program to generate square wave.
x. Explain TCON register in detail
xi. Explain following instructions
    1. XCHD
    2. CJNE
xii. Explain the Pins of 16 x 2 Alphanumeric LCD
xiii. Write a program in assembly language to generate a square wave of 1 KHz with 50% duty cycle on P1.1 pin of 8051 microcontroller. Use timer 0 to generate the delay.
xiv. Explain the structure of port 1 with the help of neat diagram.
xv. Explain logical instructions with the help of example.

Q.3. Solve any two:

a) What is addressing mode? Explain the various addressing modes with the help of example.
b) Interface LCD to 8051. Write an ALP to display " I m Busy " on LCD.
c) What are the steps in executing an interrupts? Explain in detail all the six interrupts in 8051.
d) Write assembly language program to transfer the message "SMART CITY" serially at baud rate 2400, 8 bit data and 1 stop bit.
e) Interface matrix keyboard to 8051. Write an ALP or C program to display the ASCII code of the pressed key.
f) Draw and explain the architecture of 8051.
g) Interface ADC 0809 with 8051. Write an ALP or C program to convert the analog signal connected at channel 1 to digital.
h) Draw Interface diagram to interface 8K program ROM and 8K RAM to 8051. Write an ALP to transfer data from external data memory locations 8000 H – 800F H to the internal locations 40 H – 4F H.
i) Interface DAC0808 to 8051. Write an ALP or C program to generate square wave.

Q.4. Solve any four:

i. List out the features of PIC 16F877.
ii. Draw and explain the STATUS register.
iii. Explain PWM module in PIC 16F877.
iv. Write down the steps to read data to EEPROM.
v. Explain TXSTA register in PIC 16F877.
vi. Explain timer 2 of PIC 16F877 with help of neat diagram.
vii. Explain the following pins of PIC 16F877:
1.$\overline{MCLR}$/Vpp and 2. RB0/INT
viii. Explain the register format of RCSTA in PIC 16F877.
ix. Explain timer1 in detail of 16CXX.
x. Explain the register format of option_register in PIC 16F877.
xi. Explain the Watchdog Timer in PIC 16F877.
xii. Explain timer 2 module in detail of PIC16F877.
xiii. Explain PSP of PIC 16F877.
xiv. Explain the register format of TXSTA in PIC 16F877.
xv. What are the steps required for Writing to the EEPROM data memory.

Q.5. Solve any two:

a) Explain ADC module with the help of steps to initialize it.
b) Explain in detail I2C module. How to initialize MSSP module in I2C mode.
c) Explain PIC 16F877 architecture.
d) Explain ADCON0 register of ADC. What are the steps required for doing an A/D Conversion.
e) With the help of neat diagram, explain PWM module of PIC 16F877.
f) Draw and explain block diagram of PIC 16F877.
g) Draw and explain block diagram of PIC 16F877.
h) Explain PWM module in PIC 16F877.
i) Explain in detail MSSP module in PIC 16F877.

	Class: Final Year B. Tech, Sem.-I, Mechanical Engineering **Subject:** Refrigeration & Air Conditioning (Question Bank) Pattern: CBCS
1.	Explain Effect of change in evaporator & condenser pressure on COP of VCC.
2.	Discuss the limitations of Reversed Carnot Cycle with vapor as Refrigerant.
3.	Describe with neat sketch a boot strap air refrigeration system.
4.	Enumerate the various methods of aircraft refrigeration system and explain regenerative air cooling system.
5.	Explain Need of Refrigeration System in Aircraft
6.	Explain Actual Vapour Compression Cycle.
7.	Explain Subcooling & Superheating in VCC.
8.	A Carnot refrigerator requires 1.3 kW per ton of refrigeration to maintain a temperature of –40°C. Determine : i) COP of the refrigerator, ii) the temperature at which the heat is rejected, iii) the amount of heat rejected in kJ/min., and iv) COP, if the cycle is used as a heat pump.
9.	A Bell – Coleman cycle works between 1 bar and 6 bar. Compression follows $PV1^{.25} = C$ and expansion follows $PV^{1.3} = C$. Find COP and capacity of unit in tons of refrigeration, if the air flow is 0.5 kg/s. Assume compression and expansion begins at 7°C and 37°C respectively
10.	A 5 TR, R12 refrigeration plant has saturated suction temperature of -5^0C. The condensation takes place at 32^0C and there is no under cooling of refrigerant liquid.

	Assuming isentropic compression calculate: a. COP of plant b. Mass flow rate of refrigerant. c. Power required to run the compressor in KW. Take Cp of superheated vapour as 0.615KJ/Kgk

T[^{0}C]	P[Bar]	Hf[KJ/Kg]	Hg[KJ/Kg]	Sg[KJ/Kgk]
-5	2.61	-	249.3	1.557
32	7.85	130.5	264.5	1.542

11.	Explain the Bell Coleman cycle with the help of its P-V and T-S diagram . Also show for Bell Coleman cycle COP = $(1/(r_p^{(r/(r-1)-1)})$ where r_p= pressure ratio
12.	The capacity of a refrigerator is 200TR when working between -6^0 C and 25^{0}C.Determine the mass of ice produced per day from water at 25^{0}C.Also find the power required to drive the unit. Assume that the cycle operates on reversed Carnot cycle and latent heat of Ice is 335KJ/Kg.
13.	Explain Cascade Refrigeration System with P-H Diagram.
14.	What are the methods of improving COP of VCRs ? Explain with line diagram Cascade refrigeration system.
15.	Explain by flow diagram and on p-h diagram the compound compression with flash inter cooling with single expansion valve along the flow line to evaporator.
16.	Explain 2 stage compressions with water intercooler on p-h diagram.
17.	Enumerate desirable properties of refrigerant.
18.	Explain the effect of CFC on Ozone depletion.
19.	Define Primary refrigerants and classify primary refrigerants.
20.	Write short note on -Total Equivalent Warming Impact.

21.	Explain designation system refrigerants. Find chemical formula for R-12, R-114 and R-123.
22.	Draw a neat diagram of LiBr absorption system and explain its working.
23.	Compare Vapour compression and Vapour absorption Refrigeration system.
24.	Explain with neat sketch the working principle of Electrolux Refrigerator.
25.	State the functions of the following components in an absorption system with neat diagram- a. Absorber b. Rectifier c. Analyser c. Heat Exchanger
26.	Describe the simple Aqua-Ammonia Vapour absorption system with the help of neat diagram.
27.	Define Following terms- a. DBT b. WBT c. Specific Humidity. d. DPT
28.	Define the following terms, 1) Bypass factor 2)ADP 3) Relative Humidity 4)Thermodynamic wet bulb temp
29.	For a DBT of 38°C and RH of 70%. Calculate the following for air if barometric pressure is 1 bar. i) Specific humidity ii) Enthalpy of air iii) DPT iv) Partial pressure of dry air.
30.	Write a short note on-Bypass factor of cooling coil.
31.	Atmospheric air at 30°C DBT and 75% RH enters a cooling coil at the rate of 200 CMM. The coil dew point temperature is 14°C and bypass factor of coil is 0.1. Find : i) Temperature of air leaving cooling coil ii) Capacity of cooling coil in ToR.
32.	A sample of moist air has DBT of 43^0C & WBT of 29^0C.Calculate the following without making use of psychrometric Chart. 1. Partial Pressure of water vapour. 2. Specific Humidity. 3. Relative Humidity 4. Dew Point Temperature

	5. Humid Specific Heat 6. Enthalpy.
33.	A sling psychrometer records 35°C Dry Bulb Temperature (DBT) and 25°C Wet Bulb Temperature (WBT). Calculate the following psychrometry properties without using psychrometry chart : i) specific humidity, ii) relative humidity, iii) Dew Point Temperature (DPT) and iv) enthalpy
34.	Define following : i) Bypass factor ii) ADP iii) SHF.
35.	Write a note on air washer and its applications
36.	200 CMM of air is passed through adiabatic humidifier. The condition of air at inlet is 40^{o}C DBT & 15% RH. The outlet condition is 25^{0}C DBT and 20^{0}C WBT. Find DPT and the amount of water vapour added to air per minute.
37.	Explain Following terms & represent in on psychrometric Chart a. GSHF b. RSHF c. ERSHF d. ADP
38.	Explain the procedure to draw RSHF line on Psychrometric chart when supply air conditions are not known.
39.	Air is flowing at the rate of 100 m^3/min at 40°C dry bulb temperature and 50% relative humidity is mixed with another air stream flowing at the rate of 20 m3/min at 26°C dry bulb temperature and 50% relative humidity. The mixture flows over a cooling coil whose apparatus dew point temperature is 10°C and by-pass factor is 0.2. Find the dry bulb temperature and relative humidity of air leaving the coil. If this air is supplied to an air conditioned room where dry bulb temperature of 26°C and relative humidity of 50% is maintained, also estimate : i) Room sensible heat factor ii) Cooling load capacity of the coil in TR.
40.	Develop an expression for Equivalent diameter of rectangular duct.
41.	Explain the terms- a.Aspect Ratio b. Equivalent Diameter c. Dynamic Pressure d. Draft

42.	Describe (write a note on) the thermal exchange of human body & Environment.
43.	Discuss the factors affecting on Human Comfort.
44.	Write down general rules in designing the duct.
45.	Draw neat diagram of comfort chart & explain effective temperature.
46.	Explain in detail methods of duct design.
47.	What are the different factors considered in load estimation sheet for comfort application?
48.	Explain the limitations of VCRS system for production of low temperature.
49.	What is Cascade refrigeration system ? Draw a schematic diagram of a cascade system of refrigeration and explain with the help of P-h diagram.
50.	With schematic diagram and T-s plot explain Linde cycle.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Science and Technology

Third Year B. Tech. (Computer Science & Engineering)

Semester – II

CS324 - ARTIFICIAL INTELLIGENCE

University Question Bank

Sr. No.	Questions	Marks
1	Explain AO* Search Algorithm with example.	4
2	Define Artificial Intelligence and what are the Applications of AI?	4
3	What is PEAS? Explain different agent types with their PEAS descriptions.	4
4	Explain how a problem solving agent works?	4
5	Explain Foundations of Artificial Intelligence?	4
6	Discus the Heuristic Search Technique in AI.	4
7	Define state-space search technique.	4
8	Differentiate Informed & Uninformed search. Give examples.	4

9	Explain A* Search Algorithm with example.	4
10	Explain how a constraint satisfaction problem (CSP) may be solved.	4
11	Explain in detail First Order Logic.	4
12	What is a Knowledge Based System?	4
13	What are the four basic types of agent program in any intelligent system?	4
14	Describe the four categories under which AI is classified with examples.	4
15	Differentiate forward and backward reasoning.	4
16	Explain in detail about uninformed search strategies with example.	4
17	Explain in detail about informed search strategies with example.	4
18	Give the components of a KBS.	4
19	Describe the Issues in knowledge representation	4
20	Explain in detail situation calculus.	4
21	Write a note on Bayesian Network.	4
22	Explain in detail Statistical learning?	4
23	Explain sequential decision problems.	4
24	What if AI does succeed?	4
25	Write a short note on Non-monotonic Reasoning.	4
26	Explain elementary game theory.	4
27	Differentiate supervised learning and unsupervised learning.	4

28	Explain in detail Q-learning.	4
29	Difference between Weak AI and Strong AI.	4
30	Explain in detail about conditional Probability.	4
31	What is inference? List some of the rules of inference.	4
32	Explain in detail about Decision theory.	4
33	Write a short note on Monotonic Reasoning.	4
34	Define Bayes theorem .	4
35	Explain in detail supervised learning with example.	4
36	Explain with a diagram Model based agent and Learning agent.	8
37	Explain the following search strategies :- i) best first search ii) ii) A* search	8
38	Explain the steps involved in knowledge Engineering process. Give an example.	8
39	Write Short note on i) Description logics ii) Situation calculus	8
40	Explain with a diagram Goal Based agent and Utility Based agent.	8
41	What is uninformed search algorithm? Explain BFS and DFS Algorithm.	8
42	What is Ontological Engineering? Explain with the diagram the upper ontology of the world.	8
43	Explain with a diagram Simple Reflex agent and Model Based Reflex agent.	8
44	Explain the following uninformed search strategies with examples. i) Breadth First Search. ii) Depth First Search	8
45	Write short note on i) Present situation of AI ii) Future of AI	8

46	Explain in detail basis of utility theory.	8
47	Explain with example Bayesian Network.	8
48	Write short note on i) Supervised learning ii) Unsupervised learning	8
49	Explain in detail Philosophical presuppositions of AI.	8
50	Explain in detail elementary game theory with example.	8
51	Explain Probability and Baye's theorem along with example.	8
52	What is Reinforcement learning? Explain types of Reinforcement learning.	8
53	Explain in detail basis of utility theory.	8

Question Bank: DSP (ET324) TY E&TC (Part I) wef 2020

Subject: Digital Signal Processing

Q. No	Short Answer Questions (Attempt any four (4 *4) =16)
1	Define the Auto correlation and Cross correlation
2	Determine whether the following system are linear, time-invariant i)y(n) = Ax(n) +B ii) y(n) =x(2n) iii)y(n) =n x2 (n) iv)y(n) = a x(n)
3	What are the advantages of DSP over analog signal processing
4	Find cross correlation of x(n) = {1, 2, 3,4} y(n) = {1, 1, 2 ,1}
5	Determine circular convolution using concentric circle method x[n] = {1, 2, 3, 1} & h[n] = {4, 3, 2, 2}.
6	What is the relation between DFT and z transform?
7	State & prove any two properties of DFT.
8	What are Twiddle factors of the DFT? Give its properties?
9	Determine the Discrete Fourier transform x (n) = {1, 1, 1, 1}.
10	Find 4-point DFT of x[n] = {1, -1, 1, -1} using DIF algorithm
11	Compute the DFT for the sequence. {0.5,0.5,0.5,0.5,0,0,0,0}
12	Find the IDFT of Y (k) = {1, 0, 1, 0}.
13	Differentiate between Overlap Add & Overlap Save methods
14	Find Auto correlation of x(n) = {1, 2 , 3,4} y(n) = {1, 1 , 2 ,1}
15	Find linearity of system i) $y[n] = x^2[n]$ ii) y[n] = n x[n].
16	Find cross correlation of x(n) = {1, 2 , 4,4} y(n) = {1, 2 , 2 ,1}
17	Explain DFT as linear transformation
18	Check for following systems are linear, causal, time in variant, stable, static i) y(n) =x(2n) ii) y(n) = cos (x(n)) iii) y(n) = x(n) cos (x(n) iv) y(n) =x(-n+2) v) y(n) =x(n) +n x (n+1)
19	Determine the signal is periodic or not sin 20πt+ sin5πt.
20	Find Cross correlation of sequence x[n] = {2, 1, 2, 4} & y[n] = {1, 2, 3, 1}.
21	What is DFT & IDFT?
22	What is Correlation? Explain Types of correlation.
23	Find auto correlation of sequence x[n] = {2, 1, 2, 4} & y[n] = {1, 2, 3, 1}.
24	Explain use of DFT in linear filtering.
25	Compare linear and circular convolution.
26	Compare DIT and DIF.
27	What is meant by in place in DIT and DIF algorithm?

28	Find 4 point DFT using DIF of x (n) = {0, 1, 2, 3}
29	What is bit reversal in FFT?
30	Give the equation specifying Bartlett, Hamming and rectangular window.
31	How many multiplication and additions are required for N point DFT using radix 2 FFT?
32	What are the advantages FFT over DFT?
33	Find DFT using DIT FFT of x(n) = {½, ½, ½, ½}.
34	What are the design techniques available for IIR filter?
35	By impulse invariance method obtain the digital filter transfer function H(z) $H(s) = 2/(s+1)(s+2)$ for T=1 sec
36	Obtain the cascade and parallel form realizations for the following systems Y (n) = -0.1(n-1) + 0.2 y (n-2) + 3x (n) +3.6 x (n-1) +0.6 x (n-2)
37	Define Bilinear Transformation.
38	Obtain the cascade form realizations of FIR systems H (z) = 1+5/2 z-1+ 2z-2 +2 z-3
39	What are the desirable properties of windowing technique?
40	Explain the characteristics of Analog low pass Butterworth filter
41	Obtain the i) Direct forms ii) cascade iii) parallel form realizations for the following systems Y (n) = 3/4(n-1) – 1/8 y(n-2) + x(n) +1/3 x(n-1)
42	Compare impulse invariant and bilinear transformation.
43	Determine the direct form of following system H (z) =1+2z-1 - 3z-2 + 4z-3 - 5z-4
44	Why rectangular window is not used in FIR filter design using window method?
45	Realize the system in cascade form $H(Z) = \frac{1+\frac{1}{2}Z^{-1}}{(1-Z^{-1}+\frac{1}{4}Z^{-2})(1-Z^{-1}+\frac{1}{2}Z^{-2})}$
46	Obtain the Direct form II Y (n) = -0.1(n-1) + 0.72 y(n-2) + 0.7x(n) -0.252 x(n-2)
47	What is prewarping? Why is it needed?
48	Explain applications of DSP in Audio Processing.
49	Explain applications of DSP in Image Processing.
50	Explain the application of DSP in telecommunication in detail
Q2	**Long Answer Questions (Attempt any one (1 *12) =12)**
1	i) Find linear convolution of the following sequences using Overlap Save Method. x[n] = {3, -1, 0, 1, 3, 2, 0, 1, 2, 1} & h[n] = {1, 1, 1}. ii) Differentiate between Circular & Linear convolution.
2	i) What is Correlation? Explain Types of correlation in detail. ii) Find cross correlation of x(n) = {1, 2 , 3,4} y(n) = {1, 1 , 2 ,1}

3	i) Find the DFT of a sequence x(n)={1,1,0,0} and find IDFT of Y(k) ={1,0,1,0} ii) State & prove any two properties of DFT
4	i) Explain Overlap save method. ii) Find output of a filter whose impulse response is h(n)= {1,1,1} & input signal x(n)={3,-1,0,1,3,2,0,1,2,1} using overlap save method.
5	i) Find x(n) using DIT FFT where X(n) = {1, 0, 2, 0, 3, 0, 4, 0}. ii) Explain similarities & differences between DIF & DIT algorithms.
6	i) Explain Overlap save method. ii) Find output of a filter whose impulse response is h(n)= {1,2,3} & input signal x(n)= {1,2, -1,2,3, -2,-3,-1,1,1,2,-1} using overlap add method.
7	i) Find output of a filter whose impulse response is h(n)= {1,2,3} & input signal x(n)= {1,2, 1, -2,3,2, -3,-1,1,-1,2,-1} using overlap add method. ii) Write short note on frequency analysis of signals using DFT.
8	i) Find output of a filter whose impulse response is h(n)= {2,1,3} & input signal x(n)= {3,2, 4, -2,3,2, -3,-1,1,-1,2,-1} using overlap add method. ii) Write short note on frequency analysis of signals using DFT.
9	i) What is Correlation? Explain Types of correlation. ii) Find Auto & cross correlation of x(n) = {1, 2, 3,4} y(n) = {1, 1, 2 ,1}
10	i) Explain Overlap save method. ii) Perform linear convolution operation of h(n)= {1,1,2,1} & input signal x(n)={1,-1,1,2,1,0,1,-4,3,2,1,0,1,1} using overlap add method.
11	i) Design an ideal low pass filter using Fourier method whose desired frequency response is $H_d(e^{jw}) = 1 \quad for\ \frac{\pi}{4} \leq \lvert w \rvert \leq \pi$ $= 0 \quad for\ \lvert w \rvert \leq \frac{\pi}{4}$ Determine the impulse response *h(n)* for N = 11. Determine *H(Z) & H'(Z).* (ii) Explain finite word length effect of FIR filter.
12	i) Derive and draw the 4-point FFT-DIF butterfly structure ii) Find 4-point DFT using DIF of x (n) = {0, 1, 2, 3}
13	i) Explain impulse invariance method. ii) Consider a FIR lattice filter with coefficients $k_1 = \frac{1}{4}$; $k_2 = \frac{1}{4}$; $k_3 = \frac{1}{3}$. Determine the FIR filter coefficients for direct form structure.
14	Obtain the i) Direct form I & II ii) cascade iii) parallel form realizations for the following systems y(n) = 0.2(n-1) – 0.4 y(n-2) + x(n) +0.8 x(n-1)
15	i) Obtain cascade form realization of the system function $H(Z) = (1 + 2Z^{-1} - Z^{-2})(1 + Z^{-1} - Z^{-2})$ ii) Consider an FIR lattice filter with coefficients

	$k_1 = \frac{1}{4}$; $k_2 = \frac{1}{4}$; $k_3 = \frac{1}{3}$. Determine the FIR filter coefficients for direct form structure.
16	i) Derive and draw the 4-point FFT-DIT butterfly structure ii) Find DFT using DIT FFT of x(n) = {½, ½, ½, ½}.
17	i) What are Gibbs oscillations? ii) Design a HPF of length 7 with cut off frequency of 2 rad/sec using Hamming window. Plot the magnitude and phase response.
18	i) Define Bilinear Transformation. ii) Design a single pole low pass digital IIR filter with -3db bandwidth of 0.2Π by using bilinear transformation
19	Obtain the i) Direct form I & II ii) cascade iii) parallel form realizations for the following systems y(n) = 3/4(n-1) – 1/8 y(n-2) + x(n) +1/3 x(n-1)
20	i) Derive and draw the 4-point FFT-DIT butterfly structure ii) Find DFT using DIT FFT of x(n) = {2,2,2,2}.

Subject : Applied Thermodynamics (Question Bank)
Class:-S.Y.B.Tech (Mechanical Engg.) Sem-I
Pattern: (CBCS, New w.e.f. June 2021)

01.	State first law of thermodynamics. What are its limitations?
02.	What is formation reaction? Write minimum two examples of formation reaction
03.	Define the following terms: a)Standard Enthalpy of Reaction. b)Standard enthalpy of Formation. c) Standard Enthalpy of Combustion d) Stochiometric air: fuel ratio
04.	Calculate the standard enthalpy at 298.15 K for the reaction $4NH_3(g)+5O_2(g)\rightarrow 4NO(g)+6H_2O(g)$ Given that standard enthalpies of formation for as $NH_3(g)$ = 45.72 KJ/mol NO(g) =90.43 KJ/mol H_2O (g) = -242 KJ/mol.
05.	One Kmol of Octane (C_8H_{18}) is burned with air that contains 20 Kmol of O_2. Assuming products of combustion contain only CO_2, H_2O, O_2 and N_2. Determine the mole no. of each gas in the products and Air fuel ratio for combustion process.
06.	Calculate the standard enthalpy change at 298.15K for the reaction $C_5H_{12}(g)+8O_2(g)\rightarrow 5CO_2(g)+6H_2O(g)$ Given that, standard heat of formation are $CO_2(g)$=-393kJ/mol $H_2O(g)$=-242kJ/mol $C_5H_{12}(g)$=-146.5kJ/mol.
07.	Calculate the standard heat of reaction for the following: $C_2H_2(g)+5/2\ O_2(g)$ $2CO_2(g)+H_2O(g)$ Where the enthalpy of formation for $C_2H_2(g)$=226.9KJ/mol, $H_2O(g)$=-242KJ/mol, $2CO_2(g)$=-393 KJ/mol
08.	Derive an expression for entropy change of an ideal gas for isothermal process.
09.	Prove that entropy is a property of system.
10.	State and prove principle of increase of entropy.
11.	Derive the following relation for the entropy change of an ideal gas $\Delta S = C_p \ln (v_2/v_1) + C_v \ln (p_2/p_1)$.
12.	How is COP of heat pump related to the COP of refrigerator.
13.	State Kelvin –Plank and Clausius statements of second law of thermodynamics and how they are equivalent to each other.
14.	Consider 1 kg of ice at -10 ^{0}C as a system. It is exposed to surrounding at 25 ^{0}C.The ice melts to water, ultimately coming to equilibrium with surrounding. Find the entropy change of system, surrounding and universe take Cp (ice)=2.095 KJ/KgK and latent heat of fusion =333.5 KJ/Kg for water
15.	Ice melts at 0^0C with latent heat of fusion of 334.92kJ/kg. At atm. press. water boils at 100^0C with latent heat of vapourisation 2254kJ/kg. Calculate the entropy change of fusion and vaporization processes.
16.	A reversible heat engine operates between three constant temp. reservoirs at 600 K, 400K and 300K. It receives 2500 KJ of heat from the reservoir at 600 K and does 1000 KJ of work. Determine the direction and magnitude of the heat interaction with the other two reservoirs.

17.	A hot copper block of mass 30 kg and at a temp. of 500^0C is dropped in 200 kg of oil at 20^0C.If Cp_{oil} =2.5 kJ/kgk and Cp_{copper} =0.5 kJ/kgk, find the change in entropy of universe.
18.	In a carnot cycle, heat is added at 480^0 C, producing a change in entropy of 5.65 kJ/K. The work delivered per cycle is 2360 KJ. Determine the temperature at which the heat is rejected.
19.	Heat engine receives reversibly 420 KJ/cycle of heat from a source at 327 ^{0}C and rejected heat reversibly to a sink at 27 °C. There is no other heat transfer. Show which of following cases the cycle is irreversible, reversible and impossible i) 210 KJ/cycle is rejected ii)105 KJ/cycle is rejected iii)315 KJ/ cycle is rejected
20.	A reversible engine receives heat from two constant temperature sources at 870K and 580K.It rejects 3000 kJ/min to a sink at 290K. The engine develops 85kW. Determine the heat supplied by each source and the efficiency of engine.
21.	A lump of the steel weighing 30 kg at a temp. of 427 ^{0}C is dropped in 150 kg of oil at 27^0C. The specific heats of the steel and oil are 0.46 kJ/kgK and 2.5 kJ/kg respectively. Estimate the entropy change of steel, the oil, and the system consisting of oil and lump of steel.
22.	Give in detail classification of Boilers.
23.	State the charecteristics of high pressure boilers. Expalin constructaional details of any one high pressure bolier.
24.	Define the following : a) Boiler b) Equivalent evaporation c) Boiler efficiency d) Incomplete combustion e) Evaporative capacity
25.	Enlist the different losses in a boiler and draw model heat balance sheet for boiler.
26.	The following data were obtained in boiler trial Feed water =690Kg/hr Temp.of feed water =27^0C Steam press =10 bar steam condition= 0.95 dry Coal used =92 kg/hr C.V.of coal =26000 KJ/kg Ash and unburnt coal collected =5kg/hr C.V.of unburnt coal with ash =2500 KJ/kg Flue gases formed =17 Kg/kg of coal Flue gases temp. =370 ^{0}C Boiler house temp. =32 ^{0}C Cp(gases) =1KJ/kg^{0}C Determine a)Boiler efficiency b) draw heat balance sheet one kg of coal basis.
27.	The following data were obtained during the boiler trial for one hour Feed water supplied =1520kg Temp. of feed water =30^0C Steam pressure and quality =8.5 bar,0.95 dryness, Coal burnt =200 kg C.V of coal =27300 KJ/kg . Unburnt coal collected =16 kg C.V of ash =2730kJ/kg , Mass of fuel gasses =17.3 kg/kg of coal Take Sp.heat of flue gasses =1.1 kJ/kg K Draw heat balance sheet on one kg of coal basis.
28.	A boiler produces wet steam having dryness fraction 0.90. The working pressure of boiler is 12 bar absolute It generates steam at the rate of 640 kg/hr and consumes coal at the rate of 80 kg/hr, if the calorific value of coal is 31,400 kJ/kg and water is fed at temp. of 20^0C, calculate (i) equivalent evaporation/kg of coal(ii) factor of evaporation (iii)boiler efficiency.
29.	Compare Rankine cycle and Carnot cycle.

30.	Derive an expression for thermal efficiency of Rankine cycle and mention the advantages over Carnot cycle.
	In a steam turbine steam at 20 bar and 370^0C is expanded to 0.08 bar. it then enters a condenser, were it is condensed to saturated liq. water. The pump feeds back the water into boiler . Assume ideal processes. Find per kg of steam a)The net work done b)Work ratio c) Cycle efficiency.
31.	Determine the efficiency of Rankine cycle and heat rejected in condenser using steam as a working fluid, having condenser press. is 10kPa and boiler press. is 2MPa.steam leaves boiler as saturated vapour.
32.	A Rankine cycle has steam entering the turbine at 100 bar and 450^0C.If the exhaust pressure is 0.70 bar, and all processes are reversible, find: a) Cycle thermal efficiency b) Work ratio Steam rate
33.	In a rankine cycle, dry saturated steam enters turbine at a pressure of 15 bar and the exhaust pressure is 0.075 bar.determine a) Rankine cycle efficiency. Specific steam consumption.
34.	Steam at 15 bar and 300°C is supplied to an engine working on Rankine cycle. The exhaust takes place at 0.8 bar. Calculate : a) Condition of steam after isentropic expansion b) Rankine cycle efficiency c) Improvement of efficiency if exhaust takes place at 0.5 bar.
35.	What is nozzle? What are its different types?
36.	Write a short note on steam nozzle.
37.	Define nozzle efficiency and state factors affecting it.
38.	Define Mach Number . Explain different types of flow based on Mach number.
39.	What do you mean by compounding of steam turbines? Discuss various methods of compounding steam turbines.
40.	Derive an expression for maximum blade efficiency of a single stage impulse turbine
41.	With velocity triangles and various sketches, explain the difference between impulse and reaction turbine.
42.	Write short notes on Classification of steam turbine
43.	Show that maximum blade efficiency in a single stage impulse turbine is given by $\eta_{bmax} = \cos^2\alpha$ with usual notations.
44.	Write short note on Pressure compounding
45.	Compare impulse and reaction steam turbine..
46.	Classify steam turbines. Also explain principle of operation of impulse steam turbine.
47.	Explain various losses in steam turbines.
48.	Explain the principle of operation of steam turbine.
49.	Derive the relation for power developed in Parson's reaction turbine and draw velocity triangle.
50.	What are the various advantages of using a condenser in the steam power Plant
51.	Explain the classification of condenser in detail & explain with sketch each condenser type.
52.	Derive an expression for amount of mass of cooling water required for the condenser.

53.	Explain the terms condenser efficiency and vacuum efficiency in connection with steam condensers
54.	Explain construction and working of forced draft and induced draft cooling towers. Give their merits and demerits
55.	Define condenser & explain with Sketch the elements of steam condensing plants
56.	Explain the effect of air leakage in a condenser. What are the sources of air in condenser?
57.	Define a steam condenser and state its objects. Explain the reason for inefficiency in surface condenser.
58.	Classify condensers and mention their merits and demerits in the light of steam power plant
59.	What is natural draught cooling tower? What are limitations? how does water loss occurs in cooling tower?
60.	With neat sketch explain any one surface type condenser.
61.	Explain construction and working of low level jet condensers with neat sketch
62.	Explain the various elements of steam Power Plant
63.	Explain the need of 'Intercooling' in a multistage compressor. Drive the expression for Intermediate pressure for minimum work input for a two-stage compressor
64.	Explain the need of multistage in a reciprocating compressor with a suitable diagram.
65.	Derive the expression for a polytropic work done in a single stage reciprocating air compressor with a suitable P-V diagram.
66.	Write equation for work done/cycle for single stage single acting reciprocating compressor with clearance and without clearance. Explain the effect of clearance on work done i) per kg of air ii) per cycle.
67.	Derive an expression for volumetric efficiency of a reciprocating compressor with usual notations.
68.	What is necessity of multistage compression? Discuss advantages of multistage compression with intercooling.
69.	Why isothermal compression is best process for reciprocating compressor? Explain with neat P-V diagram.
70.	Write short notes on: 1) Clearance in compressors.2) F.AD. (Compressor)
71.	What do you mean by multistage compression? State its advantages. Draw the P-V diagram for for a single- stage compressor.
72.	Derive the equation for optimum interstage pressure for 2 stage reciprocating compressor with prefect intercooling.
73.	Air is to be compressed in a single state reciprocating compressor from 1.013 bar and 15^0C to 7 bar. Calculate the indicated power required for a free air delivery of 0.3 m^3/min, when the compression process is a) Isentropic b) Polytronic and n = 1.25.
74.	A 3 stage air compressor works between pressures of 100 KPa and 5MPa for 1m^3 of air taken in, calculate : a)Work required assuming conditions to be for maximum efficiency. b) Isothermal work required between the same pressure limits. c) Isothermal efficiency take n=1.3
75.	A single stage reciprocating compressor has a bore of 200 mm and stroke of 300 mm.It runs at speed of 480 rpm. The clearance volume is 6% of the swept volume and law for compression, expantion is $PV^{1.32}$=C. Intake pressure is 98 kPa and temp.is 27^0C and compressor delivery pressure is 500 kPa. Determine

	a) Volumetric efficiency b) Power required to run compressor c) Isothermal power d) Isothermal efficiency
76.	Air compressor compresses air from 1bar to 7 bar. The clearance volume is 2.13 litre and compression and expansion are polytropic with n=1.3 if volumetric efficiency is 85% determine Stroke volume b) Diameter of cylinder if length of stroke is 30 cm
77.	A two-stage reciprocating air compressor with perfect intercooling takes in air at 1 bar pressure and 27^0 C . The law of compression in both the stages is $PV^{1.3}$=constant. The compressed air is delivered at 9 bar from the H.P.cylinder to an air receiver. Calculate per kg of air, a)The minimum work done b)The heat rejected to the intercooler
78.	A single stage reciprocating air compressor has a swept volume of 2000 cm^3 and runs at 800 rpm.it operates on a pressure ratio of 8, with a clearance of 5% of swept volume. Take the inlet conditions as 1.01325 bar and 15^0C.the compression and expansion are polytropic with n=1.25 calculate : a) Indicated power b) Volumetric efficiency c) FAD
79.	A single stage , single acting compressor delivers 15m^3 of free air per minute from 1 bar to 8 bar. The speed of compressor is 300 rpm. Assuming that compression and expansion follows the law $pv^{1.3}$=C and clearance is $1/16^{th}$ of swept volume, find the diameter and stroke of the compressor. Take L/D=1.5. The temp. and pressure of air at the suction are as atm air.
80.	Single-stage double -acting air compressor *is* required to deliver 14m^3 of air per minute measured at 1.013 bar and 15°C. The delivery pressure is 7 bar and the speed 300 rpm, Take the clearance volume as 5% of the swept volume with the compression and expansion index of n=1.3.Calculate i) Swept volume ii) The delivery temperature iii) Indicated power
81.	20m3 of air per minute is compressed from 1 bar and 20°C to 10.24 bar. Determine: a) The minimum power required to drive the compressor with two stage compression and compare it for single stage compression. b) The heat removed in the intercooler for perfect intercooling.
82.	Following data relate to a performance test of a single acting 14 cm × 10 cm reciprocating compressor. Suction pressure = 1 bar Suction temperature = 20^0C Discharge pressure = 6 bar Discharge temperature = 180^0C Speed of compressor = 1200rpm Shaft power = 6.25kW Mass of air delivered = 1.7 kg/min Calculate, a) The actual volumetric efficiency b)The indicated power The isothermal efficiency d)The mechanical efficiency
83.	A single stage, double acting compressor has a free air delivery (FAD) of 14 m^3/min measured at 1.013bar and 15^0C. the pressure and temp in cylinder during induction are 0.95 bar and 32^0C. the delivery pressure is 7 bar and index of compression and expansion n = 1.3. the clearance volume is 5% of swept volume . Calculate: i) Indicated power required ii)Volumetric efficiency
84.	Steam at a pressure of 2.5 bar with a velocity of 60 m/s and the dryness fraction of 0.96 reaches the nozzles of one stage of an impulse turbine. The pressure of steam that drops along the nozzles is 0.7 bar and the 5% of the isentropic enthalpy drop is absorbed in overcoming friction. The nozzles are inclined at an angle of 16° to the plane of wheel, and the ratio of blade velocity to the tangential component of steam velocity is 0.43. If the blade velocity coefficient is 0.86, find the blade angles so that the steam May enter

	the blade without shock and leave them in an axial direction. Find also the power input and frictional losses over the blades per kg of steam.
85.	In De-Laval turbine steam issues from a nozzle with a velocity of 1200 m/s. the nozzle angle is 20º. The mean blade speed is 400 m/s. The inlet and outlet angles of blade are equal. The mass of steam flowing through turbine per hour is 1000 kg calculate: i)Blade angles ii)Relative velocity of steam entering the blade iii)Tangential force on blade iv) Power developed. Take K = 0.8
86.	The following data relate to a stage of impulse reaction turbine. Steam velocity coming out of nozzle = 245 m/s, nozzle angle = 20º, blade mean speed = 145 m/s, speed of rotor = 300 rpm, blade height = 10 cm, specific volume of steam at nozzle outlet and blade outlet respectively = 3.45 m^3/kg and 3.95 m^3/kg, power developed by the turbine = 287 kW, efficiency of nozzle and blades combinedly = 90%, carry over coefficient = 0.82, Find a) Heat drop in each stage b) Degree of reaction c) Stage efficiency
87.	Steam issues from the nozzle of a De-laval turbine with a velocity of 1200 m/s. the nozzle angle is 20º, the mean blade velocity is 400 m/s and inlet and outlet angle of blade are equal. The mass of steam flowing through turbine per hour is 900 kg. calculate a) Blade angles b) Relative velocity of steam entering the blades c) Tangential force on the blades d) Power developed e) Blade efficiency Assume K = 0.8
88.	Steam flows from the nozzle of a single row impulse turbine with a velocity 450 m/s at a direction which is inclined at an angle of 16^0 to the peripheral velocity. Steam comes out of the moving blades with an absolute velocity of 100 m/s in the direction at 110^0 with the direction of blade motion. The blades are equiangular and stream flow rate is 6 kg/s. determine power loss due to friction.
89.	The following data relates to single stage impulse turbine Steam velocity = 600 m/s Blade speed = 250 m/s Nozzle angle = 20^0 Blade outlet angle = 25^0. Neglecting friction , calculate work developed by the turbine for a steam feed rate of 20kg/s. Also calculate axial thrust on the bearing.
90.	In De-Laval turbine steam issues from a nozzle with a velocity of 1000 m/s. the nozzle angle is 20º. The mean blade speed is 300 m/s. The inlet and outlet angles of blade are equal. The mass of steam flowing through turbine per hour is 800 kg calculate: i)Blade angles ii)Relative velocity of steam entering the blade iii)Tangential force on blade iv) Power developed. Take K = 0.8

Subject : Applied Thermodynamics (Question Bank)
Class:-S.Y.B.Tech (Mechanical Engg.) Sem-I
Pattern: (CBCS, New w.e.f. June 2019)

01.	State first law of thermodynamics. What are its limitations?
02.	What is formation reaction? Write minimum two examples of formation reaction
03.	Define the following terms: a)Standard Enthalpy of Reaction. b)Standard enthalpy of Formation. c) Standard Enthalpy of Combustion d) Stochiometric air: fuel ratio
04.	Calculate the standard enthalpy at 298.15 K for the reaction $4NH_3(g)+5O_2(g)\rightarrow 4NO(g)+6H_2O(g)$ Given that standard enthalpies of formation for as $NH_3(g)$ = 45.72 KJ/mol NO(g) =90.43 KJ/mol H_2O (g) = -242 KJ/mol.
05.	One Kmol of Octane (C_8H_{18}) is burned with air that contains 20 Kmol of O_2. Assuming products of combustion contain only CO_2, H_2O, O_2 and N_2. Determine the mole no. of each gas in the products and Air fuel ratio for combustion process.
06.	Calculate the standard enthalpy change at 298.15K for the reaction $C_5H_{12}(g)+8O_2(g)\rightarrow 5CO_2(g)+6H_2O(g)$ Given that, standard heat of formation are $CO_2(g)$=-393kJ/mol $H_2O(g)$=-242kJ/mol $C_5H_{12}(g)$=-146.5kJ/mol.
07.	Calculate the standard heat of reaction for the following: $C_2H_2(g)+5/2\ O_2(g)$ $2CO_2(g)+H_2O(g)$ Where the enthalpy of formation for $C_2H_2(g)$=226.9KJ/mol, $H_2O(g)$=-242KJ/mol, $2CO_2(g)$=-393 KJ/mol
08.	Derive an expression for entropy change of an ideal gas for isothermal process.
09.	Prove that entropy is a property of system.
10.	State and prove principle of increase of entropy.
11.	Derive the following relation for the entropy change of an ideal gas $\Delta S = C_p \ln (v_2/v_1) + C_v \ln (p_2/p_1)$.
12.	How is COP of heat pump related to the COP of refrigerator.
13.	State Kelvin –Plank and Clausius statements of second law of thermodynamics and how they are equivalent to each other.
14.	Consider 1 kg of ice at -10 ^{0}C as a system. It is exposed to surrounding at 25 ^{0}C.The ice melts to water, ultimately coming to equilibrium with surrounding. Find the entropy change of system, surrounding and universe take Cp (ice)=2.095 KJ/KgK and latent heat of fusion =333.5 KJ/Kg for water
15.	Ice melts at 0^0C with latent heat of fusion of 334.92kJ/kg. At atm. press. water boils at 100^0C with latent heat of vapourisation 2254kJ/kg. Calculate the entropy change of fusion and vaporization processes.
16.	A reversible heat engine operates between three constant temp. reservoirs at 600 K, 400K and 300K. It receives 2500 KJ of heat from the reservoir at 600 K and does 1000 KJ of work. Determine the direction and magnitude of the heat interaction with the other two reservoirs.

17.	A hot copper block of mass 30 kg and at a temp. of 500^0C is dropped in 200 kg of oil at 20^0C.If Cp_{oil} =2.5 kJ/kgk and Cp_{copper} =0.5 kJ/kgk, find the change in entropy of universe.
18.	In a carnot cycle, heat is added at 480^0 C, producing a change in entropy of 5.65 kJ/K. The work delivered per cycle is 2360 KJ. Determine the temperature at which the heat is rejected.
19.	Heat engine receives reversibly 420 KJ/cycle of heat from a source at 327 ^{0}C and rejected heat reversibly to a sink at 27 °C. There is no other heat transfer. Show which of following cases the cycle is irreversible, reversible and impossible i) 210 KJ/cycle is rejected ii)105 KJ/cycle is rejected iii)315 KJ/ cycle is rejected
20.	A reversible engine receives heat from two constant temperature sources at 870K and 580K.It rejects 3000 kJ/min to a sink at 290K. The engine develops 85kW. Determine the heat supplied by each source and the efficiency of engine.
21.	A lump of the steel weighing 30 kg at a temp. of 427 ^{0}C is dropped in 150 kg of oil at 27^0C. The specific heats of the steel and oil are 0.46 kJ/kgK and 2.5 kJ/kg respectively. Estimate the entropy change of steel, the oil, and the system consisting of oil and lump of steel.
22.	Give in detail classification of Boilers.
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24.	Define the following : a) Boiler b) Equivalent evaporation c) Boiler efficiency d) Incomplete combustion e) Evaporative capacity
25.	Enlist the different losses in a boiler and draw model heat balance sheet for boiler.
26.	The following data were obtained in boiler trial Feed water =690Kg/hr Temp.of feed water =27^0C Steam press =10 bar steam condition= 0.95 dry Coal used =92 kg/hr C.V.of coal =26000 KJ/kg Ash and unburnt coal collected =5kg/hr C.V.of unburnt coal with ash =2500 KJ/kg Flue gases formed =17 Kg/kg of coal Flue gases temp. =370 ^{0}C Boiler house temp. =32 ^{0}C Cp(gases) =1KJ/kg^{0}C Determine a)Boiler efficiency b) draw heat balance sheet one kg of coal basis.
27.	The following data were obtained during the boiler trial for one hour Feed water supplied =1520kg Temp. of feed water =30^0C Steam pressure and quality =8.5 bar,0.95 dryness, Coal burnt =200 kg C.V of coal =27300 KJ/kg . Unburnt coal collected =16 kg C.V of ash =2730kJ/kg , Mass of fuel gasses =17.3 kg/kg of coal Take Sp.heat of flue gasses =1.1 kJ/kg K Draw heat balance sheet on one kg of coal basis.
28.	A boiler produces wet steam having dryness fraction 0.90. The working pressure of boiler is 12 bar absolute It generates steam at the rate of 640 kg/hr and consumes coal at the rate of 80 kg/hr, if the calorific value of coal is 31,400 kJ/kg and water is fed at temp. of 20^0C, calculate (i) equivalent evaporation/kg of coal(ii) factor of evaporation (iii)boiler efficiency.
29.	Compare Rankine cycle and Carnot cycle.

30.	Derive an expression for thermal efficiency of Rankine cycle and mention the advantages over Carnot cycle.
	In a steam turbine steam at 20 bar and 370^0C is expanded to 0.08 bar. it then enters a condenser, were it is condensed to saturated liq. water. The pump feeds back the water into boiler . Assume ideal processes. Find per kg of steam a)The net work done b)Work ratio c) Cycle efficiency.
31.	Determine the efficiency of Rankine cycle and heat rejected in condenser using steam as a working fluid, having condenser press. is 10kPa and boiler press. is 2MPa.steam leaves boiler as saturated vapour.
32.	A Rankine cycle has steam entering the turbine at 100 bar and 450^0C.If the exhaust pressure is 0.70 bar, and all processes are reversible, find: a) Cycle thermal efficiency b) Work ratio Steam rate
33.	In a rankine cycle, dry saturated steam enters turbine at a pressure of 15 bar and the exhaust pressure is 0.075 bar.determine a) Rankine cycle efficiency. Specific steam consumption.
34.	Steam at 15 bar and 300°C is supplied to an engine working on Rankine cycle. The exhaust takes place at 0.8 bar. Calculate : a) Condition of steam after isentropic expansion b) Rankine cycle efficiency c) Improvement of efficiency if exhaust takes place at 0.5 bar.
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36.	Write a short note on steam nozzle.
37.	Define nozzle efficiency and state factors affecting it.
38.	Define Mach Number . Explain different types of flow based on Mach number.
39.	What do you mean by compounding of steam turbines? Discuss various methods of compounding steam turbines.
40.	Derive an expression for maximum blade efficiency of a single stage impulse turbine
41.	With velocity triangles and various sketches, explain the difference between impulse and reaction turbine.
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43.	Show that maximum blade efficiency in a single stage impulse turbine is given by $\eta_{bmax} = \cos^2\alpha$ with usual notations.
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63.	Explain the need of 'Intercooling' in a multistage compressor. Drive the expression for Intermediate pressure for minimum work input for a two-stage compressor
64.	Explain the need of multistage in a reciprocating compressor with a suitable diagram.
65.	Derive the expression for a polytropic work done in a single stage reciprocating air compressor with a suitable P-V diagram.
66.	Write equation for work done/cycle for single stage single acting reciprocating compressor with clearance and without clearance. Explain the effect of clearance on work done i) per kg of air ii) per cycle.
67.	Derive an expression for volumetric efficiency of a reciprocating compressor with usual notations.
68.	What is necessity of multistage compression? Discuss advantages of multistage compression with intercooling.
69.	Why isothermal compression is best process for reciprocating compressor? Explain with neat P-V diagram.
70.	Write short notes on: 1) Clearance in compressors.2) F.AD. (Compressor)
71.	What do you mean by multistage compression? State its advantages. Draw the P-V diagram for for a single- stage compressor.
72.	Derive the equation for optimum interstage pressure for 2 stage reciprocating compressor with prefect intercooling.
73.	Air is to be compressed in a single state reciprocating compressor from 1.013 bar and 15^0C to 7 bar. Calculate the indicated power required for a free air delivery of 0.3 m^3/min, when the compression process is a) Isentropic b) Polytronic and n = 1.25.
74.	A 3 stage air compressor works between pressures of 100 KPa and 5MPa for 1m^3 of air taken in, calculate : a)Work required assuming conditions to be for maximum efficiency. b) Isothermal work required between the same pressure limits. c) Isothermal efficiency take n=1.3
75.	A single stage reciprocating compressor has a bore of 200 mm and stroke of 300 mm.It runs at speed of 480 rpm. The clearance volume is 6% of the swept volume and law for compression, expantion is $PV^{1.32}$=C. Intake pressure is 98 kPa and temp.is 27^0C and compressor delivery pressure is 500 kPa. Determine

	a) Volumetric efficiency b) Power required to run compressor c) Isothermal power d) Isothermal efficiency
76.	Air compressor compresses air from 1bar to 7 bar. The clearance volume is 2.13 litre and compression and expansion are polytropic with n=1.3 if volumetric efficiency is 85% determine Stroke volume b) Diameter of cylinder if length of stroke is 30 cm
77.	A two-stage reciprocating air compressor with perfect intercooling takes in air at 1 bar pressure and 27^0 C . The law of compression in both the stages is $PV^{1.3}$=constant. The compressed air is delivered at 9 bar from the H.P.cylinder to an air receiver. Calculate per kg of air, a)The minimum work done b)The heat rejected to the intercooler
78.	A single stage reciprocating air compressor has a swept volume of 2000 cm^3 and runs at 800 rpm.it operates on a pressure ratio of 8, with a clearance of 5% of swept volume. Take the inlet conditions as 1.01325 bar and 15^0C.the compression and expansion are polytropic with n=1.25 calculate : a) Indicated power b) Volumetric efficiency c) FAD
79.	A single stage , single acting compressor delivers 15m^3 of free air per minute from 1 bar to 8 bar. The speed of compressor is 300 rpm. Assuming that compression and expansion follows the law $pv^{1.3}$=C and clearance is $1/16^{th}$ of swept volume, find the diameter and stroke of the compressor. Take L/D=1.5. The temp. and pressure of air at the suction are as atm air.
80.	Single-stage double -acting air compressor *is* required to deliver 14m^3 of air per minute measured at 1.013 bar and 15°C. The delivery pressure is 7 bar and the speed 300 rpm, Take the clearance volume as 5% of the swept volume with the compression and expansion index of n=1.3.Calculate i) Swept volume ii) The delivery temperature iii) Indicated power
81.	20m3 of air per minute is compressed from 1 bar and 20°C to 10.24 bar. Determine: a) The minimum power required to drive the compressor with two stage compression and compare it for single stage compression. b) The heat removed in the intercooler for perfect intercooling.
82.	Following data relate to a performance test of a single acting 14 cm × 10 cm reciprocating compressor. Suction pressure = 1 bar Suction temperature = 20^0C Discharge pressure = 6 bar Discharge temperature = 180^0C Speed of compressor = 1200rpm Shaft power = 6.25kW Mass of air delivered = 1.7 kg/min Calculate, a) The actual volumetric efficiency b)The indicated power The isothermal efficiency d)The mechanical efficiency
83.	A single stage, double acting compressor has a free air delivery (FAD) of 14 m^3/min measured at 1.013bar and 15^0C. the pressure and temp in cylinder during induction are 0.95 bar and 32^0C. the delivery pressure is 7 bar and index of compression and expansion n = 1.3. the clearance volume is 5% of swept volume . Calculate: i) Indicated power required ii)Volumetric efficiency

T.Y B-Tech (Mechanical Engineering) Semester-II

Question Bank (7 marks questions)

Project management (Professional Elective)

1. Explain how project is monitored and controlled for project execution?
2. What are the characteristics of Project management?
3. Discuss Risk Breakdown Structure (RBS)
4. Breifly explain Scoring models of project selection
5. " Project Audit Plays important role in project management " Discuss?
6. Write short note on Top down and Bottoms?
7. Why meetings are useful in project monitoring? What rules should be followed to maximize effectiveness of meetings?
8. What is crashing of a project ? Explain with small example process of crashing ?
9. What are the risk response strategies for negative risks (threats) and positive risks (opportunities) ?
10. Who are stakeholders in project ? Discuss their importance ?
11. What is work breakdown structure (WBS)?
12. If you are co-ordinator to organise a one week student training workshop in your college write down a WBS for this project ?
13. List and briefly describe the ways projects may be terminated ?
14. Discuss some non technical reasons for project termination?
15. Why communication is most important job for project manager ?
16. Explain probability and impact matrix?
17. Differentiate between the Functional, Pure Project and Matrix organizations?
18. What are different ways for closing a project ?
19. Explain project management template ?
20. What are different stages of team development and growth ?Explain barriers to team effectiveness?
21. Discuss scope creep in context with project management ?
22. Differentiate between the Functional, Pure Project and Matrix?
23. Discuss Payback period advantages and disadvantages ?
24. Explain characteristics of Return on investment (ROI) ?
25. Explain with example IRR ,Present value and Net present value ?
26. Discuss characteristics of scoring models ?
27. What do you mean by Three Point Estimates ?
28. Write short note on Bottom-up Estimating ?Discuss its characteristics ?
29. Explain with one example Jobbing and Factoring method ?

30. What do you mean by Project Budgeting ?
31. Explain Project Budgeting Process with example in details ?
32. What is purpose of Project Execution and Control?
33. Discuss in brief Planning of PIMS
34. Explain in depth Design of PIMS ?
35. Write short note on Productivity ?
36. Explain partial productivity with example ?
37. Tell during which phase of project the following statements occurs " Use the project scope statement to gain approval of the final & scope from the stakeholders before further planning is done" Discuss on same?
38. Reanalyze existing risks is important in project management ? Discuss?
39. Why the following statement is important "To Verify and document that the project, or project phase, meets completion or exit criteria set in place during project planning "
40. Explain role of GANTT in project management ?
41. Write short note on " MS project " ?
42. Discuss Network diagram?
43. Write short note on Network cost system ?
44. Discuss " Project Planning process " in context with software industry ?
45. Explain measures of variability with suitable example ?
46. Explain the term performance measurement with example ?
47. Discuss controlling of projects in manufacturing industry ?
48. What are effects of delayed project in software industry like TCS or Infosys ?
49. Discuss steps involved in determining critical path ?
50. The initial Investment and net cash flow for two projects proposals are A and B are given in following table. Select the project based on NPV assuming discount factor of 15%.
    A -10000 3000 3000 7000 6000 (for End of years 0,1,2,3,4)
    B -10000 6000 6000 3000 3000 ((for End of years 0,1,2,3,4)

Final Year B.Tech (Part - II) New- Examination 2022
Electronics & Telecommunication Engineering
Elective IV-NETWORK SECURITY

Question Bank

Section I

Que. Attempt Short questions.

1. What is difference between monoalphabetic cipher and polyalphabetic cipher?

2. Explain the public key distribution using public key authority.

3. Explain Caesar cipher with example.

4. Differentiate between Active attack and Passive attack.

5. Draw the diagram and describe the structure of Feistel Cipher which is used for encryption in a round of DES.

6. Explain the model of network security with diagram.

7. Explain the Rail fence transposition technique with example.

8. Differentiate between Stream cipher and Block cipher.

9. Explain the concept of steganography.

10. Explain any two block cipher modes of operation.

11. Explain public key infrastructure.

12. Explain with diagram Principles of public key cryptography.

13. Write a note on Rotor Machine.

14. Describe Secure Socket Layer.

15. Write short note on secure shell (SSH).

16. Explain in detail X.509 certificate.

Que .Attempt questions.

17. Explain different types of security attack.

18. Define i) Security attack ii) Security Services iii) Security mechanisms

19. Describe RSA algorithm with help of example.

20. What is buffer overflow? What are the types of buffer overflow?

21. Explain the working of DES with diagram

22. Explain network access control in detail.

23. With the help of time line diagram explain SSL handshake protocol action between client and server.

24. Write a note on Transport Layer Security.

25. Explain SSL Record protocol with its application.

Section II

Que. Attempt following questions.

1. Explain transport and tunnel mode of IPSecurity.
2. Explain the Functionality of S/MIME.
3. Write a short note on different applications of IPsecurity.
4. Explain in detail classifications of cybercrime.
5. What is Buffer overflow and how to minimize it?
6. Differentiate between Virus and Worm.
7. Write a brief note on Wireless Security.
8. Write a note on mobile device security.
9. What is phishing attack?
10. What is social engineering explain in brief.
11. Explain in brief DoS and DDoS Attacks.
12. Explain how botnets can be used as a fuel to cybercrime.
13. Explain Trojan Horses and Backdoors.
14. Explain in brief what are five principal services provided by PGP.
15. Write a brief note on IP Security Policy.
16. Describe with diagram the case no.2 of basic combination of IPsec security associations.

Que .Attempt following questions.

17. What is PGP? How PGP provides authentication and confidentiality?
18. Explain the Cybercrime: The legal and an Indian perspective.
19. What is Phishing and Identity Theft explain in brief
20. What is ESP? Give the format of ESP packet.
21. Explain about the cybercrime & Indian ITA 2000.
22. Explain Security Association and its parameters.
23. What are the different types of viruses? Explain in detail.
24. Who are cybercriminals? Classify Cybercrimes.
25. What is SQL Injection? Describes steps for SQL Injection Attacks.

QUESTION BANK

CLASS : B.Tech Electrical Engineering Semester-I

SUBJECT: PLC AND SCADA (Elective – I)

1. State and explain advantages and disadvantages of PLC.
2. What is the selection criteria for PLC .
3. Explain Boolean logic & relay logic and analysis of rungs
4. Explain Central Processing Unit of PLC.
5. What is ladder diagram ? How it is different than the normal circuit diagram ?
6. Explain scan cycle in detail.
7. Note: Energy management system
8. Write a short note on input module
9. Explain Variable Speed (Variable Frequency) AC motor drive.
10. Explain how SCADA system is used in electric power generation.
11. Explain seven layers of OSI model and their functions. Compare OSI Model with TCP/IP Model.
12. This is an alarm system. There are four hazard inputs to the alarm system A, B, C, D that go on as some operational malfunction occurs.
    a. The system operates as follow :
        i. If any one inputs are ON, nothing happen.
        ii. If any two inputs are ON, a red pilot light goes on.
        iii. If any three inputs are ON, an alarm siren sounds.
        iv. If all four are ON, the fire department is notified.
        v. Develop Gate Logic, PLC Ladder logic and Relay Logic for alarm system.
13. Explain input on/off Swiching devices & analog input devices
14. Draw and explain architecture of PLC.
15. What is CPU ? Explain its main Section and also explain important function of each section.
16. Explain different types of switches.
17. Explain first, second, third generation of SCADA architecture
18. Explain Ethernet layers and their relationship to CIP.
19. What is the difference between OSI and TCP/ IP Model.
20. What is open system Interconnection Protocols ? Explain function of each layer in detail
21. Write a short note on EMS.
22. Develop the PLC Ladder logic and Relay Logic for
    b. Forward Stop Reverse Starter 2) Forward-Reverse Starter.
23. Explain IEC61850 layered architecture protocol.
24. Explain SCADA data transfer through PLCC.
25. What Ethernet / IP Protocol
26. Explain different types of switches. Why different types of I/O modules are required to be interfaced with PLC? Explain functioning of PLC input and output module with neat diagram.
27. Compare SCADA and PLC.

28. Explain ladder logic programming Technique with symbols of PLC.
29. Develop a Ladder Logic Diagram to ON & OFF a motor with single button; ON at first press and OFF at second press.
30. . Develop the ladder diagram for forward-reverse control of a 3 phase induction motor.
31. Develop ladder and wiring diagram of DOL starter with OLR
32. . With reference to Ladder logic, draw the symbols of following instructions: (i) NO (ii) OSR (iii) Output coil (iv) NC
33. Explain important feature of DNP3 PROTOCOL
34. Draw & Explain IEC61850 layered architecture.
35. Short note : Device Net, Control Net, Ether Net/IP.
36. Explain SCADA server.
37. Describe Master Terminal Unit, Remote Terminal Unit
38. What is tuning of PID controller ? Explain PID tuning methods in detail.
39. Draw and explain SCADA system in Petroleum Refining Process.
40. Draw and explain SCADA system in water purification system

Punyashlok Ahilyadevi Holkar Solapur University,Solapur
Department Of Electrical Engineering
Class: - S.Y. B. Tech. (EE) Sem-I

Subject : POWER SYSTEM –I
Question Bank (PS- I)

1. Discuss the factors governing the choice of site selection for hydro power plant.
2. Explain the site selection of Thermal power plant
3. What are the different types of loads? Explain

4. Explain the following terms
   i) Maximum demand
   ii) Demand factor
   iii) Diversity factor
   iv) Load factor
5. Define following terms
   a. Peak load
   b. Load factor
   c. Diversity Factor
   d. Plant utility factor
6. Explain the site selection of hydroelectric power plant
7. With the help of neat sketch explain hydro power plant
8. With the help of neat sketch explain gas turbine power plant.
9. Draw the Schematic Arrangement of Nuclear Power Station and explain.
10. Explain Base Load and Peak Load on Power Station.
11. A generating station has a connected load of 43MW and a maximum demand of 20 MW; the units generated being 61·5 × 106 per annum. Calculate (i) the demand factor and (ii) load factor
12. The peak load on power station is 40 MW. The loads having maximum demands of 30 MW, 5MW, 8MW are connected to power station. The annual load factor is 50%. Find: Average load on Power Station, Demand Factor, diversity Factor & Load Factor
13. A Power Station has maximum demand of 15000kW. The annual load factor is 50% & Plant Capacity factor is 40%. Determine the Reserve Capacity of the Plant.
14. A Power Station has a maximum demand 0f 10 MW. The annual load factor is 60% & plant capacity factor is 50%. Determine the reserve capacity of plant
15. A generating station has maximum demand of 20MW & connected load of 40MW. The units generated being 60x106 per annum. Calculate demand factor & load factor.
16. Define Average load on Power Station, Demand Factor, diversity Factor & Load Factor
17. Define plant capacity,plant use factor,Reserve capacity,
18. How to calculate units generated per annum.
19. Explain electric power system with neat diagram or Explain single line Diagram.
20. Compare AC-DC Transmission system
21. Compare between overhead and underground Transmission system.
22. What is Tariff ? Explain different types of Tariffs
23. Differentiate between overhead and underground system.
24. Compare value of conductor marerial required for DC Systems i.e. DC 2wire systems and dc 3 wire system.
25. Explain the schematic diagram of Thermal power plant
26. Explain the schematic diagram of Nuclear power plant
27. Explain the site selection of Nuclear power plant

28. What do you mean by Peak load power plants? Give different types of PLPP.
29. What do you mean by Base load power plants? Give different types of BLPP
30. Explain site selection for Diesel power plant .
31. Draw schematic diagram of Diesel power plant and explain its components.
32. Explain site selection for Gas Turbine plant.
33. Draw schematic diagram of Gas Turbine plant and explain its components.
34. State and explain Kelvin's law to detrermine the economic size of Transmission conductor
35. State and prove Kelvin's law for size of conductor for transmission .Discuss its limitations.
36. Derive the equation for conductor material requiredin 2-wire d.c. system with one conductor earthed
37. In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self-capacitance of each insulator, find (i) the distribution of voltage over 3 insulators and (ii) string efficiency
38. Explain electric power system with neat diagram or Explain single line Diagram
39. What are the different types of Commonly used conductor materials.
40. Compare AC-DC supply system
41. Explain typical a. c. Power Supply Scheme
42. What are the methods improving String Efficiency?
43. Explain the various types of loads on the power system.
44. The maximum demand on a power station is 100 MW. If the annual load factor is 40% , calculate the total energy generated in a year.
45. Write short notes on the following :
    (i) load curves
    (ii) load division on hydro-steam system,
    (iii) load factor
    (iv) plant capacity factor
46. Write short note on load curves.
47. Define and explain the importance of the following terms in generation :
    (i) connected load
    (ii) maximum demand
    (iii) demand factor
    (iv) average load.
48. What do you understand by (i) base load and (ii) peak load of a power station ?
49. What is electric power supply system ? Draw a single line diagram of a typical a.c power supply scheme.
50. What are the advantages and disadvantages of d.c. transmission over a.c. transmission ?
51. State and prove Kelvin's law for size of conductor for transmission. Discuss its limitations.
52. Name the important components of an overhead transmission line.
53. Discuss the various conductor materials used for overhead lines.
54. Discuss the various types of line supports.
55. Discuss the various types of Insulators used in overhead lines.
56. Why are insulators used with overhead lines ? Discuss the desirable properties of insulators.
57. Define and explain string efficiency. Can its value be equal to 100% ?
58. Explain various methods of improving string efficiency.
59. Define string efficiency.
60. Compare between overhead and underground cables.
61. Compare between AC and DC Transmission.
62. What do you mean by Tariff? Explain different types of Tariff.
63. Draw a single line diagram of a typical a.c power supply scheme.

Walchand Institute of Technology, Solapur

Civil Engineering Department

Subject: - Elective III -Repairs and Rehabilitation of Structures B.Tech Final Year

Question bank (each carries 6 marks)

Q1) Explain types of maintaince required for structures.

Q2) Explain Bacterial Concrete.

Q 3) Explain the term Retrofitting and Rehabilitation.

Q4) Explain in detail about quality assurance for concrete structures.

Q5) Describe with sketches the repairs techniques used when structure subjected to cracking problems.

Q6) Describe with sketches the repairs techniques used when structure subjected to corrosion problems.

Q7) Describe polymer concrete.

Q8) Write a note on factors affecting durability of concrete.

Q9) Write a note on Vacuum Concrete.

Q10) Enlist sensors used for building instrumentation. Explain any one.

Q13) Write a note on fiber reinforced concrete.

Q14) Write note on engineered demolition techniques for dilapidated Structures.

Q15) Describe causes of distress in concrete structures.

Q16) Write a note on repairs in underwater structures.

Q17) Explain the various techniques to repair spalling and disintegration of concrete.

Q18) Write note on effect of climate on concrete.

Q 19) Explain deflection due to strengthening of slabs.

Q 20) Explain Jacketing of column.

Q 21) Explain polymer concrete and fiber reinforced concrete.

Q22) Explain repairs of cracks in concrete.

Q23) Write note on quality assessment of concrete.

Q24) Explain effect of chemical attack on concrete.

Q25) Write note on effect of corrosion on concrete.

Q26) Explain cause of corrosion on concrete.

Q27) Write note on effect of leakage in concrete structures.

Q28) Explain foamed concrete.

Q29) Explain retrofitting techniques for beams with sketches.

Q30) Explain retrofitting techniques for columns.

Question bank (each carries 8 marks)

Q1) Explain Shotcrete and Guniting

Q2) Describe with sketches the strengthening methods- Retrofitting, Jacketing.

Q3) Describe the factors causing deterioration of concrete structures.

Q 4) Describe with sketches the repairs techniques used when structure subjected to cracking, corrosion problems.

Q5) Explain the retrofitting techniques used in repairs of columns and slabs.

Q6) Explain about the importance of maintenance and various facets of maintenance of a concrete structure in detail.

Q7) Explain use of sensors for building instrumentation.

Q8) Engineered demolition techniques for dilapidated structures.

Q 9) Describe repairs in under water structures in detail.

Q10) Explain underpinning and shoring .

Q11) Explain Bacterial concrete and polymer concrete in detail.

Q12) Explain repairs techniques used for underwater structures in detail.

Q13) Explain strengthening methods used for r.c.c slab, beam and column with sketches.

Q14) Explain cause of corrosion and remedies of corrosion in R.C.C srtructure.

Q15) Explain various chemicals used in repairs of buildings with example.

B.E. (Mechanical Engineering) Semester-I

Question Bank (7 marks questions)

Entrepreneurship Development

1. Compare the carrier as an entrepreneur and other option like software engineer?
2. Short note on Characteristics and qualities of entrepreneurs ?
3. Explain in depth Classification and types of entrepreneurs ?
4. Short note on Social entrepreneurship and Corporate entrepreneurship ?
5. Discuss in brief Entrepreneurial development programmes (EDP) ?
6. Discuss Managerial, marketing, financial & technological problems faced by new entrepreneurs and their probable solutions ?
7. Explain Expansion strategies for Ancillarisation,
8. Explain Franchising in context with Mac Donald
9. Discuss Subcontracting with one example ?
10. Write short note on Idea generation – sources and methods ?
11. Discuss Preparation of a project report/business plan ?
12. Discuss outsourcing in concern with big industry like tata motors ?
13. Discuss characteristics, advantages, limitations of Outsourcing and Ancillarisation,?
14. Discuss advantages, limitations of Franchising and Outsourcing ?
15. Explain with example Break Even Analysis ?
16. Explain Significance of project report ?
17. Discuss Project appraisal in concern with Economic oriented appraisal, Financial appraisal, ?
18. Discuss Project appraisal in concern with, Managerial competency appraisal?
19. Explain SME's in detail ?
20. What are steps in setting up small industry ?
21. Explain meaning of sole proprietorship, partnership, private limited company with example ?
22. Write short note on SIDBI?
23. Discuss importance of SISI ?
24. Discuss how government supports SME sector with help of Write short note on SIDBI and NABARD ?
25. Discuss about Technology business incubation (TBI) centers ?
26. Discuss in detail Taxation benefits for SME sector?
27. Discuss Project appraisal in concern with Market oriented appraisal, Technological appraisal ?
28. Describe the business in your locality and list the various business opportunities available in the locality.
29. Give the comment on need on incentives and benefits to SSI .
30. Give list of financial institution which are helping to SSI and describe one in detail.

31. What are information contents of balance sheet and profit loss accounting .
32. explain dept and equity financing for SSI .
33. Give the funds requirement of SSI and sources to obtain that.
34. Give the comment on trading account preparation along with procedure adopted for it .
35. Discuss in brief Problems and Challenges faced by SSI in country like India ?
36. List the main points of project report for establishing new SSI unit and explain the sale plan from the project report .
37. Explain wit example the estimation of resources required for new small service Business.
38. Discuss on communication skills for Entrepreneur?
39. Explain Marketing Management for SSI ?
40. "Availability of skilled employees for SSI is difficult " Discuss?
41. Explain the present government policies for providing land ,finance ,marketing assistance and machinery for promotion of SSI unit.?
42. Discuss different sources of finance to SSI and explain how finance is available from Bank.?
43. Explain the process of Venture / Enterprise creation with the help of chart ?
44. Discuss characteristics of an entrepreneur in short and need for achievement in details.
45. Define and discuss scanning of business environment as need to identify business opportunity?
46. State various functional management from SSI and role of manager.
47. Gathering and estimation of resources is fourth step in process . Give list and detail of resources estimation ?
48. What you understand from feasibility report of project ? Explain.
49. Explain with example how working capital is estimated ?
50. Explain effect of "less funds are Sanctioned for working capital" ?
51. Discuss Impact if more funds than the estimating funds are sanctioned for working capital by the bank?
52. Prepare the tentative balance sheet for SSI unit after completion of one year from data of start of production ?
53. Discuss on Time value of money ?
54. Write short note on " Profit and loss A/C" statement for any enterprise?
55. Explain the ratio analysis and its uses .
56. Write what are problems faced during Project appraisal ?
57. Discuss SWOT method ?
58. Explain with example lean canvas model in context with entrepreneurship ?
59. Write short note on Industrial Development Corporation ?
60. Why innovation and Invention is one of prime important factor of growth for any entrepreneur ?
61. Discuss bank procedure for fund raising for any entrepreneur ?
62. Discuss Udyog Aadhaar, Role, Importance, Registration ?
63. Explain Export Potential of SMEs in developing country like India ?

64. Discuss in brief about Export procedure for any SME ?
65. Discuss Funding options available angel investors with one example ?
66. What is role of Role of Central and state Government in Subsidies ?
67. Discuss importance of market survey in preparation of project report ?
68. Discuss importance of SEZ (Special Economic Zone) for any business?
69. Discuss any Mergers importance with latest example ?
70. Explain significance of HR plan in context with business plan ?

Final Y. (B.Tech.) (Mechanical Engg.) Sem-I (New w.e.f. June 2021)

EXAMINATIONS

Subject: - Entrepreneurship Development

Question Bank

SECTION- I

1.	Describe the importance and significance of growth of entrepreneurial activity.
2.	Who is an entrepreneur? Explain in detail with different definition of entrepreneur. Or Explain the concept of Entrepreneur
3.	Explain in detail the Characteristics and qualities of entrepreneurs.
4.	Explain the classification and types of entrepreneur.
5.	Distinguish between entrepreneur and entrepreneurship.
6.	Discuss Corporate Entrepreneurship.
7.	Explain concept of Entrepreneur.
8.	Explain importance of entrepreneurship.
9.	Discuss characteristics and qualities of entrepreneur.
10.	Explain various characteristics and qualities of entrepreneurs.
11.	Explain evolution of entrepreneurship.
12.	Explain various factors influencing entrepreneurial development and motivation.
13.	What is EDP? Explain Phases and Problems faced by EDPs.
14.	What is the effect of entrepreneurship on economy?
15	List down the obstacle inhibiting entrepreneurship development. Or problem faced by Entrepreneur.
16.	Explain the various phases of EDPs or What is EDP?
17.	What is Entrepreneurial Motivation?
18.	Explain factors affecting entrepreneur.
19.	What are the objectives of EDP ?
20.	Write a note on options available to entrepreneur as franchisee.
21.	Explain factors influencing entrepreneurial development.
22.	Write a note on EDP.
23.	Explain role of culture in entrepreneurial development.
24.	Explain the problems faced by entrepreneur in detail.
25.	Write notes on: Franchising, EDP.
26.	Explain the sources and methods of Idea generation. Or What is project idea discuss the sources and methods.
27.	How do you classify the project ideas?
28.	Explain the points to be considered for preparation of project plan.

29.	Discuss in brief contents of project report.
30.	Discuss ideal operational plan.
31.	Write a note on SWOT Analysis.
32.	Write a note on Economic oriented appraisal
33.	Write a note on Financial Appraisal.
34.	Discuss idea generation, sources and its classification.
35.	Discuss in detail project appraisal methods.
36.	Explain in brief ideal market and financial plan
37.	Explain the technical services provided by SISI.
38.	Write a short note on :Taxation benefits.
39.	Write a short note on : Turnaround strategies for SMEs. SME funding.
40.	How do you define SMEs and enlist characteristics for the same.
41.	What are sources of finance for SMEs ?
42.	Discuss marketing problem faced by entrepreneur and how to manage it ?
43.	Write a note on Micro Small Medium Enterprises (MSMEs) and Tax benefits to SMEs.
44.	Write notes on SISI and SIDBI.
45.	Explain importance of small enterprises in India.
46.	Explain the Sources of financial institution for SME‘s.
47.	What is the role of Marketing mechanism in SMEs?
48.	What is the importance of export potential for SMEs?

QUESTION BANK

CIVIL ENGINEERING DEPARTMENT

Course-Final Year B. Tech-Part-II- 2021-22

Semester-II

Subject: Railway & Harbour Engineering

SECTION-I -RAILWAY ENGINEERING

Sr.No.	Questions
1.	Define gauge. What are the different types of Rail gauges used in India
2.	Define Track capacity.
3.	When and between which two stations the first railway service was started?
4.	Define tractive resistance. Define permanent way.
5.	Write a short note on hauling capacity and tractive effort
6.	What are the various types of stresses induced in a rail section? Explain briefly how these are evaluated.
7.	Explain coning of wheels and tilting of rails with neat sketch.
8.	Write about suitability conditions for broad gauge and meter gauge?
9.	Calculate the maximum permissible train load that can be pulled by a locomotive with four pairs of driving wheels with an axle load of 28,42 teach on a BG track with a ruling gradient of 1 in 200 and a maximum curvature of 3 travelling at a speed of 48,3 km/h. Take the coefficient of friction to be2.
10.	A train having 20 wagons weighing 18 tonnes each is to run at a speed of 50 kmph. The tractive effort of 2-8-2 locomotives with 22.5 tonnes load on each driving axle is 15 tonnes. The weight of locomotives is 120 tonnes Rolling resistance of wagons and locomotives are 2.5kg/tone and 3.5 kg/tone. The resistance which depends on speed is 2.65 tonnes. Find out steepest gradient for this condition. Coefficient of friction is 1/6.
11.	Explain the role of railway engineering in national and global development.
12.	Calculate max permissible train load that can be pulled by locomotive with three pairs of driving wheels with axle load of 22 tonne for BG track with ruling gradient of 1:200 and max curvature of 3.with speed of 80 Kmph, f=0.2
13.	Write about ill effects of creep?
14.	What are different types of rail sections used in Indian railways?
15.	Write a short note on failure of rail
16.	Explain types of rail sections with neat sketch.
17.	Write a short note on Wear of rails
18.	Give a typical cross section of a permanent way on an embankment indicating various components and describe their functions?
19.	What are the requirements of ideal permanent way? Describe briefly theories related to creep of rails?
20.	The sleeper density for a BG track is N+5.Find number of sleepers required for 1 km of track length.
21.	What are the parameters involved in design of ballast section. Explain in detail about general fittings of rails?

22.	What is a rail joint? State and explain various types of rail joints with neat sketches
23.	A sleeper manufacturing company casts a sleeper of 260 mm width and sends it to a railway site where the railway track laid; based on their study they decide to provide a spacing of 1.5m between the sleepers What is depth of ballast to be provided for effective distribution of load of train?
24.	Explain creep in rails. State effects of creep. Give remedial measures for the same.
25.	Explain" coning of wheel" on a level track and list the disadvantages.
26.	Describe with figures different types of fixtures and fastenings used in railways.
27.	Explain with sketch different types of rail sections.
28.	What are the factors governing the choice of gauge while construction of a railway line? Explain?
29.	Explain the classification of Railway stations? What are the considerations for site selection of railway stations?
30.	Write a short note on stabilization of track on poor soil.
31.	What are the functions of railway stations? describe the factors that influence the selection of site for railway station
32.	Write a short note on Modern Indian Railways
33.	Write a short note on Railway stations with its requirement and neat sketch
34.	Explain various methods and steps for the construction and maintenance of railway track
35.	Write a short note on underground railways
36.	Explain RDSO Specifications
37.	What are the functional requirements of railway alignment?
38.	Define gradient in railway track and state the various classifications in gradients in railway track.
39.	What are vertical curves? Name the types of vertical curves?
40.	Define cant deficiency? What are its considerations?
41.	What is negative super elevation?
42.	Define (a)Gradient (b)Ruling gradient
43.	Define grade compensation. Write its values for BG, MG and NG.
44.	What is the need of providing super elevation on curves of railway tracks? Describe relation between super elevation, gauge, speed and radius of curve?
45.	Write about the centrifugal force on a curved track with neat sketch? Explain about Equilibrium super elevation with necessary derivation?
46.	Define gradient in railway track and state the various classifications in gradients in railway track?
47.	What will be the allowable ruling gradient for BG track on 4 curve, where ruling gradient is 1: 150
48.	A 5° curve diverges from a 3° main curve in reverse direction in the layout of a B.G. yard. If the speed on branch line is restricted to 35 kmph, determine the restricted speed on main line.
49.	What super elevation should be provided on a 2 degree curve in BG track corresponding to speed of 100 Kmph
50.	What should be the gradient for a B G track when the grade resistance together with curve resistance due to a curve of 3 shall be equal the resistance due to a filling gradient of 1 in 200

51.	A curve of 5° is situated on a section of BG .If maximum permissible speed on the section is 60 kmph, determine amount of equilibrium cant. If, for meeting the demand of slow moving trains, cant deficiency amounting 7.6 cm is provided. Determine super elevation need to be provided
52.	Determine the length of vertical curve between two gradients meeting on a summit, one raising at the rate of 1 in 120 and other falling at the rate of 1 in 150
53.	a curve track diverges from a main curve of 5 in an opposite direction in the layout of BG Yard, calculate the super elevation and the speed on the branch line, it the maximum speed permitted on the main line 45 kmph Assume any data required suitably
54.	A transition curve s to be used to join the ends of a 3 94" circular curve with the straight The length of the transition curve of 120 m interval How will you set this transition curve? Work out the shift and offsets at every 30 m
55.	On a B. G. 3 curve, the equilibrium cant is provided for a speed of 70 kmph. 1) Calculate the value of equilibrium cant 2) Allowing a maximum cant deficiency, what would be the maximum permissible speed on the track?
56.	Draw a systematic layout of a right hand turnout and name thedifferent parts.
57.	What is turnout in railway track? Draw the left hand turn out of railway showing various components? Explain briefly its functioning?
58.	What is track junction? State the type of junction railway track? And also state the type of function signals in railway track?
59.	Draw a systematic sketch of a let hand turnout and name different parts
60.	What is meant by a crossing number and a crossing angle 7 How is crossing angle determined? Explain methods for the same
61.	Types of crossing.
62.	What is crossing railway track and state the various types of crossing railway tracks?
63.	Name the methods for designing turnouts?
64.	What is the function of points and crossings?
65.	What is turn out? What do you understand by direction of turnout? Also define crossing.
66.	Work out an expression for finding out total of cross-over
67.	Explain the following with neat sketches 1) Hotel divergence 2) Switch angle 3) Actual nose of crossing 4) Throw of switch
68.	On a B.G. track, a turn out takes at an angle of 6° 42' 35". Design the turn out when it is given that: 1) Angle of switch = 1° 34' 27" 2) Length of switch rails=4.73 m 3) Heel divergence d=11.43 cm 4) Straight arm X=.85 m
69.	Explain with sketch different types of signals.

70.	State the objectives of signaling.
71.	What are the advantages of automatic signaling system? Differentiate in detail in between starter and advance starter signal, co-acting and repeater signal?
72.	What are the essential features of semaphore signal? Explain the working of semaphore signal in detail with sketch.
73.	Define interlocking and state its principles illustrate your answer by taking a simple case consisting of one main me one loop line and a siding
74.	State five types of signals in railways? What is interlocking of signals in railways?
75.	Explain "principle of interlocking
76.	Write short note on High speed track.
77.	Explain control of train movement and its monitoring
78.	Write a short note on modernization of railway and railway tracks.
SECTION-II-AIRPORT ENGINEERING	
79.	Write short notes on the following 1. Growth of Air Transport 2. National Airport Authority 3. Methods of Drainage Of Airport Campus 4. Grading of Airport
80.	Write a short note on airport scenario in India
81.	Explain various aircraft characteristics
82.	Explain imaginary surfaces, approach zones & turning zones related to Airports.
83.	Explain various obstruction and zoning laws.
84.	State the items to be taken in to account in the selection of a site and layout for an airport from the points of the view of the following 1. Physical 2. Operational 3. Metrological considerations
85.	Enumerate the various factors which you would keep in view while selecting a suitable site for an airport.
86.	Distinguish topographical survey and soil survey for the selection of site at airport
87.	Write a short note on wind rose diagram with neat sketch
88.	Explain how basic runway length is determined with different cases
89.	Explain how the basic runway length is determined on the basis of the performance characteristics of jet and conventional engine aircrafts
90.	Write a short notes on: a) Holding aprons b) Inner and outer horizontal surfaces.
91.	Draw cross-section of runway showing all component parts and explain it in detail.
92.	Draw cross-section of taxiway showing all component parts and explain it in detail.
93.	The data for the hottest month of year is the year of maximum daily temperature is 43.72^{o}C and mean of average daily temperature is 20.32 ^{o}C then what is the airport reference temperature.

94.	Length of run way under standard condition is 1620m.the airport site has an elevation of 230m.reference temperature is 32.94^{o}C.if the runway is to be constructed with effective gradient of 0.2%.determine corrected runway length
95.	A taxiway is to be designed for operating an aircraft which has following characteristics. Determine turning radius of taxiway A. Wheel base-17.70 m B. Tread of main loading gear-6.62 m C. Turning speed-40kmph D. Coefficient of friction between tyre and pavement surface-0.13 and width of taxiway-22.5m
96.	The data for the hottest month of year is the year of maximum daily temperature is 43.72^{o}C and mean of average daily temperature is 20.32 ^{o}C then what is the airport reference temperature?
97.	Calculate the actual length of the runway from the following data Airport elevation Airport reference temperature 28C Basic length of runway 600 m Highest point along the length RL 2 Lowest point on the length RL 952 100 Check the total correction for elevation plus temperature as per ICAO
98.	Calculate the actual length of the runway from the following data Airport elevation: R. L. 100 Airport reference temperature : 28°C Basic length of runway 600 m Highest point along the length: R.L 98.2 Lowest point along the length R.L.95.2 Check the total correction for elevation plus temperature as per ICAO
Harbour Engineering	
99.	a) Write short note on wharf and jetties with neat sketches
100.	b) What are the factors to be considered while selecting site for harbor
101.	c) What are fenders? Why are they used? Describe various types of fenders with sketches
102.	a) Write short note on wharf and jetties
103.	b) What are the factors to be considered while selecting site for 5arbor
104.	Why it is necessary to provide facilities like aprons, transit sheds and warehouses at the ports?
105.	Write a short notes on any two with neat sketches: a) Wharf b) Quays c) Jetties
106.	a) Define harbor? List different classes of harbor. explain any one with neat sketch
107.	b) What are fenders? Why are they used? Describe various types of fenders with sketches

108.	c) Why it is necessary to provide facilities like aprons, transit sheds and warehouses at the ports
109.	Different types of breakwaters and explain any wharves
110.	a) Give a sketch showing the layout of the harbor showing break water, entrance channel, turning basin, piers and wharfs. Explain function of any two components in detail.
111.	Define breakwater and list the different types of breakwater. Explain any one with sketch.
112.	Briefly discuss on relevance of wind tides and littoral currents on the design of harbors
113.	Write a short notes on any two a) Natural Harbour b) Quays and Jetties c) Tetra pods.

Course Coordinator

(C. R. Limkar)

Punyashlok Ahilyadevi Holkar Solapur University,Solapur
Department Electrical Engineering
CLASS: T.Y. (Part – II) (New) (CBCS)
Subject : ELECTRICAL UTILIZATION

Question Bank (EU)

1) Explain series-parallel control.
2.) A train is required to run between two stations 1.6 km apart at an average speed of 40 kmph. The run is to be made to a simplified quadrilateral speed-time curve. If the maximum speed is limited to 64 kmph, acceleration to 2.0 kmphps, coasting and braking retardation to 0.16 kmphps and 3.2 kmphps, determine the duration of acceleration, coasting and braking periods.
3.) Write short note on motor selection in textile industries.
4.) Explain mono rail system.
5.) Classify transition methods. Explain shunt transition in detail.
6. Describe with the help of a neat diagram the construction and working of a high pressure mercury vapour lamp.
7. What do you understand by direct, indirect and semi-indirect lighting?
8. Explain the method of induction heating and describe coreless type of induction furnaces.
9. Derive an expression for Trapezoidal Speed-Time Curve.
10 An electric train has an average speed of 42 km/h on a level track between stops 1,400 m apart. It is accelerated at 1.7 km/h/s and is braked at 3 km/h/s. Estimate the energy consumption at the axle of the train per tonne-km. Take tractive resistance constant at 50 N per tonne and allow 10% for rotational inertia.
11. Explain train lighting system.
12. Explain with a neat sketch how the spot welding is carried out by a spot welding machine.
13. A 250 V lamp has a total flux of 2500 lumens and takes a current of 0.7 A. Calculate

(a) lumens/watt
(b) M.S.C.P./watt

14. Explain the principle of direct and indirect core type induction furnace.
15. Explain the laws of illumination.
16. Explain energy conservation in households.
17. Explain direct and indirect resistance heating techniques.
18. Explain the following terms:
i) Luminous Flux
ii) Illumination iii) Brightness iv) Glare
19. What is dielectric heating? Explain the factors on which the dielectric loss in a dielectric material depends.
20. A hall measuring 27.5m x 45.75m is to be illuminated using 250 watt filament lamps. The luminous efficiency of the 250 watt filament lamp is 14.4 lumens/watt. Inside the hall an average illumination of 108 lumens/m^2 is to be provided on the working plane. The walls and ceiling are brightly painted. Take coefficient of utilization s 0.35 and depreciation factor as 0.9. Calculate the number of lamps required for this.
21. Discuss in detail the principle of operation of (i) Ultrasonic welding and (ii) Laser welding.

22. Explain quadrilateral speed time curve. Derive the expression for total distance in km.

23. Explain the requirements of ideal traction system

24. Derive an expression for tractive effort for propulsion of train

25. A train is required to run between two stations 1.6 km apart at an average speed of 40 km/h. The run is to be made to a simplified quadrilateral speed-time curve. If the maximum speed is to be limited to 64 km/h, acceleration to 2.0 km/h/s and coasting and braking retardation to 0.16 km/h/s and 3.2 km/h/s respectively, determine the duration of acceleration, coasting and braking periods

26. What do you mean by "Electric traction"? What are the requirements of an ideal traction system? How are they met in an electric traction system?

27. What are the various traction systems in practice in our country? Give the advantages of electric drives with its limitations and discuss briefly the factors governing the final choice of traction system.

28. What do you understand by speed-time curves? What is its use in practice? Explain clearly 'free running', 'coasting' and 'braking' with reference to electric traction systems.

29. Explain speed-time curve of a train running on main line. Define 'crest speed', 'average speed' and 'schedule speed'.

30. Derive a suitable equation to determine Vm from a simplified speed-time curve

31.An electric train accelerates uniformly from rest to a speed of 48kn/hour in 24 seconds .It then coasts for 69 seconds against a constant resistance of 58 N/tonne and is braked to rest at 3.3km/hour/second in11 seconds. Calculate i) the acceleration ii) coasting retardation and iii)the schedule speed of reducing the station stops are 20 second duration. What would be the effect on schedule speed of reducing the station stops to 15 second duration, other conditions remaining same .Allow 10% for rotational inertia.

32. Describe the procedure of calculating the specific energy consumption of an electric train.

33. Discuss briefly different systems of traction.

34. Explain the requirements of ideal traction system.

35. Explain quadrilateral speed -time curve. Derive the expression for total distance in km .

36. Explain specific energy consumption of train .Discuss the various factors affecting it.

37. Write short notes on the following.

a. Factors affecting energy consumption in propelling a train.
b. Mechanics of 'train movement'
c. Dead weight, accelerating weight and adhesive weight of a train
d. Tractive effort for propulsion of train

38. A schedule speed of 45km/h is required between two stops 1.5 km apart. Find the maximum speed over the run if the stop is of 20 second duration. The values of acceleration and retardation are 2.4 km/h/s and 3.2 km/h/s respectively. Assume a simplified trapezoidal speed time curve.

38. Describe the procedure of calculating the specific energy consumption of an electric train.

39. Explain the following terms: a) Adhesive weight b) Coefficient of adhesion c) Accelerating weight.

40. Explain mechanical regenerative braking.

41. Write a short note on auxiliary equipment in traction system.

42. Explain dielectric heating and write down advantages of dielectric heating.

43. With the diagram explain laser welding.
44. With the diagram explain ultrasonic welding.
45. Define the terms: luminous flux, luminous intensity, candle power, illumination, lux
46. With neat diagram explain MV lamp and SV lamp
47. Define the terms: Reduction factor, lamp efficiency, glare, space-height ratio, utilization factor.
48. Write short note on Energy conservation in small scale industries.
49. Write short note on

a. Energy conservation in transport
b. Energy conservation in Agriculture

50. Write a short note on mechanics of train movement.
51. Write a note on electrical braking with neat diagram.
52. Explain trapezoidal speed time curve. Derive the expression for total distance in km.
53. Explain crest speed, average speed, and schedule speed and discuss factors affecting scheduled
Speed of time.
54. Write short note on motor selection in rolling mills and textile industries.
55. With the neat diagram explain series-parallel control of DC traction motors.
56. Write short note on motor selection in sugar mills.
57. Classify the transition method. Explain open circuit transition in detail.
58. Explain direct resistance and indirect resistance heating
59. Write a short note on direct and indirect arc furnace.
60. With neat diagram explain induction heating.
61. Explain the comparison between DC welding and AC welding
62. Explain the principles of energy conservation and Write short note on energy conservation in household.
63. State and explain laws of illumination
64. Write short note on street lighting and flood lighting
65. Explain the comparison between tungsten filaments lamps and fluorescent tubes.

B.Tech Civil- IV(Final year) Sem-VII New CBCS

Earthquake Engineering

Question Bank

Each question caries 9 marks

Section I

1. Describe the two approaches followed for the prediction of earthquakes. Name the major plates of the earth.
2. Explain the plate tectonics theory and its mechanism.
3. What are plate tectonics and how are they related to continental drift and sea floor spreading?
4. Explain how subduction zone forms and what occurs at such a plate boundary.
5. What is by the focus and epicentre of an earthquake? Name the two kinds of body waves and explain how they differ.
6. Discuss the main characteristics of seismic waves.
7. What are the various types of dynamic loads? State some of the characteristics of seismic loads.
8. Name the various modeling techniques of the structures. Discuss lumped mass approach in detail.
9. Give the merits and demerits of three techniques of modeling structures.
10. Write short notes on d'Alembert's principle
11. Write short notes on Inertia force
12. Write short notes on Hamilton's principle
13. Write short notes on Uncertainties of dynamic analysis
14. Derive a mathematical expression defining the dynamic displacements using d'Alembert's principle.
15. Discuss the following
16. Describe the Response factors
17. Describe the Response spectra
18. Describe the Resonance condition
19. Describe the Restoring force for seismic resitant
20. Describe the Damping mechanism

Section-II

21. State the assumptions made in the analysis of an earthquake resistant design of building.
22. What are the two seismic design requirements an engineer hat to account for the analysis design of earthquake-resistant building? Discuss briefly how these are incorporated to achieve the objective.
23. Discuss the factors required for accessing the lateral design forces
24. Discuss the factors required for accessing the design response spectrum
25. Discuss the ways and means to prevent an earthquake force from acting on super structure of a building.
26. Properties of construction materials for earthquake resistance.
27. What are the factors that make steel the most ideal material for earthquake resistance?
28. State and discuss briefly the considerations for achieving adequate performance of steel buildings.
29. What are the causes of instability of steel buildings? Discuss in detail the P-Δ effect.
30. Write short notes on Secondary effects
31. Describe the concept of Inertial force
32. Describe the concept Response spectrum factor
33. Describe the concept of Provisions of torsion
34. Describe the concept of Storey drift
35. Describe the concept of Soft storey
36. Define bands. At what levels in masonry building would you provide them? Give justification for each of them.

37. How can the rocking of masonry piers in a masonry wall be prevented?
38. What special precautions should be exercised during planning and construction of openings in a masonry wall?
39. Strong bricks and weak mortar are recommended for masonry buildings. Why?
40. Describe the various earthquake resistant features that can be introduced in masonry building to make it earthquake resistant.

Production and Operations Management

Question Bank

Final Year B.TECH. (Mechanical Engineering)

1. Explain importance production and operation management.?
2. Explain scope of production and operation management ?
3. Explain need of production and operation management ?
4. Explain make to stock and make to order production.
5. What are different types of manufacturing systems ?
6. Explain with example manufacturing system used for cement industry?
7. Compare Pharma industry manufacturing system Vs Auto industry manufacturing system
8. Evaluate the future demands using different forecasting methods.?
9. What is assembly line manufacturing system ? Explain with example ?
10. What are the functions and objectives of scheduling?
11. What are the functions and objectives of routing?
12. Compare manufacturing system Vs service system ?
13. The following data gives the sales of the company for various years. Fit the straight line. Forecast the sales for the year 2016 and 2017.

Years	2007	2008	2009	2010	2011	2012	2013	2014	2015
Sales	13	20	20	28	30	32	33	38	43

14. Compare production planning with production control?
15. Five jobs are to be processed on two machines M1 and M2 in the order M1M2 processingtime in hours are given below.

Job	01	02	03	04	05
Machine M1	05	01	09	03	10
Machine M2	02	06	07	08	04

16. Explain factors affecting make/buy decision.
17. What is scheduling? Explain any one scheduling method.
18. What is production management? Explain in brief about ultimate and intermediate objectives.
19. What is manufacturing system? Explain with one example about intermittent and continuous Manufacturing systems.

20. The demand for a product X is 1000 units and 1600 units for the month of April and May respectively using 2000 as a demand for the month of April forecast the demand for the month of June assume $\alpha = 0.2$
21. What is forecasting? Explain in brief about need of forecasting also state the various types of errors in forecasting.
22 A company purchases 15,625 unit of raw material at Rs 12 per unit meet its entire annual requirement the order cost comes to Rs 60 per order and inventor/ carrying cost is Rs. 1.20 per unit.

a) EOQ
b) Total ordering cost
c) Total carrying cost
d) Total inventory cost

23 Discuss Factors affecting Capacity in large scale organizations like Ford Motors ?
24 Explain the meaning of forecasting and prediction and explain the objective of forecasting?
25 Q2.Explain the various technique of forecasting (qualitative and quantitative)
26 What is capacity? Explain the various measures of capacity with suitable examples.
27 Explain the strategies for short and long term capacity planning?
28 Explain strategy of aggregate planning.
29 What are the objectives and functions of production planning and control?
30 Explain coordination of PPC with other departments
31 Explain the terms
Routing
Loading and Sequencing
32 What do you mean by line balancing in big organizations like General Motors?
33 The company is engaged in the assembly of a wagon on a conveyor. 500 wagons are required perday. Production time available per day is 420 minutes. The other information is given below regarding assembly steps and precedence relationships. Find the minimum number work stations, balance delay and line efficiency.
34 Explain the term production control with respect to dispatching, follow up and evolution.
35 What are different types of Inventory?
36 Explain different cost of Inventory.
37 Describe EOQ model and EBQ Model in depth.
38 Write a short note on Inventory control technique and explain below terminology ?
39 Explain below different Inventory models?
40 What are Maintenance objectives? What are different Types of Maintenance ?
41 Distinguish between preventive Vs breakdown Vs Predictive maintenance ?
42 What are the maintenance costs? Explain in detail with example
43 Write short note on
1.TPM
2. Identification of breakdown using fishbone diagram

3 . Reliability and life testing

44 Define Valve Engineering? Explain Objective and use of valve analysis

45 Write short note on Valve analysis procedure?

46 Explain in detail Phases of valve analysis?

47 Explain case study of value analysis?

48 Write short note on

1. Just in time
2. Quality function deployment (QFD)
3. Push vs Pull production system.

49 What is KANBAN system? Explain two different KANBAN system ?

50 Explain Six Sigma concept in detail. ? Explain DMAIC principle of six sigma?

51 Discuss Computer Aided Production management system ?

52 Explain Concept of Zero defect in manufacturing industry ?

53 Explain Goldratts Theory of Constraints (TOC)?

54 Discuss Bottleneck principle of theory of constraints with example?

55 Discuss two bin card system for stores department in concern with kanban ?

56 Discuss Push vs Pull type supply chain with example?

57 Discuss any 5 challenges for Supply chain management (SCM) ?

58 Discuss any 3 foundations of Supply chain management ?

59 Discuss any 6 key elements considered for Inventory management ?

60 Briefly discuss different types of waste ?

61 Discuss Reliability and life testing with one example ?

62 Calculate simple moving average 23, 23.40, 23.20, 24, and 25.50.

63 Calculate 5 year moving average for following data

Year	Value
2016	200
2017	300
2018	500
2019	500
2020	300
2021	200

64 Discuss MRP in concern with production planning ?

65 Distinguish between Fixed period and fixed quantity system ?

66 What do you know about advance manufacturing systems in production Management?

67 Explain in brief the inputs to MRP processor ?

68 ABC corporation has got a demand for particular part at 10,000 units per year. The cost per unt is Rs. 2 and it costs Rs 36 to place an order and to process the delivery. The invertory carrying cost is estimated at 9 percent of average inventory investment Determine a) ECQ b) Optimum numbers of orders to be placed per annum c) Minimum total cost of inventory per annum.

69 Explain how total productive maintenance differ from conventional Breakdown maintenance

70 Explain Dell model of Supply chain management ?

Final Year B.Tech. Mechanical w.e.f. June 2021
Free Elective – I : Entrepreneurship Development
w.e.f. June 2021
Question Bank

1. Explain meaning of entrepreneur, entrepreneurship & enterprise.
2. Explain evolution of entrepreneurship in India.
3. Explain corporate entrepreneurship.
4. Explain significance of growth of entrepreneurial activity in national development.
5. What are different characteristics & qualities of entrepreneurs?
6. Give classification of entrepreneurs
7. What are different factors influencing entrepreneurial development.
8. Explain role of culture in entrepreneurial development.
9. Write a note on Social Entrepreneurship.
10. Write a note on entrepreneurship development programmes (EDP).
11. Describe curriculum of a general EDP
12. Explain phases of an EDP.
13. Enlist all types of problems faced by new entrepreneurs.
14. Describe managerial problems faced by entrepreneurs and their probable solutions.
15. Describe financial problems faced by entrepreneurs and their probable solutions.
16. Describe marketing problems faced by entrepreneurs and their probable solutions.
17. Describe technological problems faced by entrepreneurs and their probable solutions.
18. What are options available to entrepreneurs?
19. Explain ancillarisation with suitable examples.
20. Explain franchising with suitable examples.
21. Explain outsourcing with suitable examples.
22. Explain need of idea generation, sources & classification of ideas.
23. Explain methods of idea generation.
24. Explain Environmental scanning in view of new idea.
25. Explain SWOT analysis with suitable examples.
26. What is business model? Explain model canvas used for business model generation.
27. Explain lean startup canvas model with example.
28. What are different points to be considered in a business plan
29. Explain financial documents used in project proposal
30. What are components of an ideal business/project plan?
31. What is a Project Report? What is its significance?
32. Explain project appraisal : types of appraisal and feasibility study.
33. Define micro, small and medium enterprises as per producing & servicing categories.
34. Explain role & importance of SME sector.
35. What are different policies that govern development of SME sector?
36. Explain various funding options available for small scale entrepreneurs.
37. Explain different ownership patterns with suitable examples.
38. Explain steps involved in setting up a small unit.
39. What are different sources of finance for SME?
40. What is importance of SME in national development?

41. Compare different ownership patterns.
42. What are the different taxation benefits that SMEs can avail?
43. Explain export potential of Indian SMEs.
44. Describe general export procedure.
45. Describe elements of a project appraisal.
46. Explain role of SIDBI in SME sector.
47. Explain role of SISI in SME sector.
48. Explain Technology Business Incubators in detail.
49. Explain the turnaround strategies for SMEs.
50. Write note on DIC
51. Write note on MCED
52. Write note on EPC
53. Explain problems of SMEs.
54. Write note on EDII
55. Write note on NABARD
56. Write note on NIESBUD
57. Explain different types of facilities that TBI should provide for startups.
58. Write note on Sole Proprietorship
59. Write note on Partnership Firms
60. Write note on Private Limited Company

QUESTION BANK

CIVIL ENGINEERING DEPARTMENT

Course- Third Year B. Tech-Part-I- 2021-22

Semester-I

Subject: Highway and Tunnel Engineering

Sr. No.	Questions
1.	What are the different modes of transportation and givethe importance of highway alignments.
2.	Write a short note on, 2d and 3d road developmentplan.
3.	Draw different types of road network patterns.
4.	Explain different types of surveys that are carried outbefore designing alignment
5.	Explain various characteristics of road transport incomparison with the other systems.
6.	Why highway development is needed? Write first andsecond development Plan in short.
7.	Explain with example importance of highwaytransportation and development.
8.	Describe highway development in India.
9.	Explain various characteristics of road transport incomparison with the other systems.
10.	What is camber? Give different types of it.
11.	What is SSD & OSD? Explain with the help of figure.
12.	What is super elevation? Derive the formula to find super elevation & write limiting values of e and f?
13.	Write short note on following a) Transition curve b) Vertical curve
14.	Define super elevation and design the super elevation fora horizontal highway curve of radius 250 m and design speed of 100 Kmph. Should there berestriction in speed?
15.	What is super elevation? Why it is to be provided? Derive the formula to find Super elevation and write the limiting values of 'e' and't.
16.	Explain the importance of transition curve and calculate the length of transition curve using the following data: Design speed 80 Kmph, Radius of circular curve 250 m, pavement width Including extra widening 7.8 m, allowable rate of super elevation 1 in 150 (pavement is rotated about the center line of pavement).
17.	The design speed of highway is 50 Kmph. There is a horizontal curve of radius 80 m on a certain locality with mix traffic condition. Calculate upper elevation needed to be maintained. Also calculate maximum allowable speed on this horizontal curve.
18.	Explain PIEV theory in SSD.
19.	Explain surface and sub-surface drainage system for roadway.
20.	How will you carryout CBR test on sub-grade soil?Explain your

	answer with graph.
21.	Differentiate between flexible & rigid pavement
22.	Give the different types of joints in cement concretepavement with diagram.
23.	Enumerate construction steps & quality control checksfor following base courses a) Granular sub-base course b) Water Bound Macadam course c) WET Mix Macadam course
24.	Write short note on structural evaluation of pavements.
25.	Draw a neat cross section of two lane flexible pavement with paved shoulder in embankment and show the dimensions, component parts. Enumerate the functions of each component of the pavement.
26.	d) Write a short on 1) Different types of joints in CC pavements 2) Softening point and ductility test on bitumen.
27.	Describe role played by temp. stresses and joints in rigid pavement
28.	What do you understand by Vehicle Damage Factor (VDF)? In axle load survey the following details of vehicles with various range of axle load are 9800 vehicles per day with rear axle loads in the range 2500 to 3500 kg and growth rate of 6.5% p.a The road pavement is expected to be constructed in a period of 2 years after this study and the flexible pavement structure is to be designed for a life of 15 years. Determine the VDF and value of CSA for design. The standard axle load is 8160 kg.
29.	Determine the warping stresses at interior, edge and corner of a 25 cm thick cement concrete pavement with transverse joints at 5.0 m interval and longitudinal joints at 3.6 m intervals. The modulus of sub grade reaction K is 6.9 kg/cm and radius of loaded area is 15 cm. Assume temperature differential during day to be 0.6°C per cm slab thickness (for warping stress at interior and edge) and maximum temperature differential of 0.4°C per cm slab thickness during the night (for warping stress at the corner). Assume e = 10x10-6 per °C, E 3x105 kg/cm2, u 0.15. Use Bradbury Chart.
30.	Define the terms "Radius of relative stiffness' and'Equivalent radius of resisting section. A rigid pavement 3m x 0.2 m has modulus of sub gradereaction 8kg/cm, Poisson's ratio 0.15, Coefficient of thermal expansion 10 x 10C, E 3 X 10' N/mm, Bradbury coefficient Cx 0.9, Cy 0.8, the radius ofcontact between the road and tyre 0.15m, the temperatureGradient during night is 15°C (for warping stress at interior and edge). Determine warping stresses at interior and edge region.
31.	a) C.C. Pavement is constructed using the following data: a) Modulus of elasticity 3 x 105 kg/cm^2 b) Poisson ratio 0.15 c) Thickness of CC pavement 18 cm d) Modulus of sub grade reaction = 6.0 kg/cm e) Wheel load=5100 kg f) Radius of loaded area = 15 cm Calculate stresses at interior, Edge and corner byWestergaard's method. Determine the probable location where the crack is likely to be developing

	comer loading.
32.	Calculate the radius of relative stiffness of 15 cm thickcement concrete slab, from following data for two values of 'K 1) Modulus of Elasticity of cement concrete 2,10,000kg/cm^2 2) Poisson's ratio for cone = .13 3) Modulus of sub grade reaction K.
33.	Write a note on surface and subsurface drainage system.
34.	Mention the specifications of materials and construction steps for Water Bound Macadam (WBM) road.
35.	State different types of pavements and discuss their suitability.
36.	Write a short note on Highway drainage: Surface and sub-surface drainage.
37.	Write a short note on Pavement failures, causes.
38.	Explain quality control tests for Granular sub base course
39.	Explain quality control tests for WMM
40.	Explain quality control tests for WBM
41.	How will you carry out highway maintenance?
42.	Give Explain highway user benefits.
43.	Write a short note on highway cost & vehicular operation cost.
44.	What is economic analysis & give the methods of it.
45.	What is highway financing & give the different forms of project financing.
46.	With neat sketches explain different shapes of tunnel &its suitability
47.	Describe heading & bench method of tunneling in hardrock
48.	State the objectives of tunnel lining & discuss differentmaterials used in tunnel lining
49.	Describe drainage in tunneling.
50.	List the different methods tunnel construction in hard rock and explain any one method with neat sketch stating its merits and demerits.
51.	State the objectives of tunnel lining and discuss on different materials used in tunnel lining.
52.	Describe heading and bench method of tunneling in hardrock
53.	With neat sketches explain different shapes of tunneland discuss its advantages and disadvantages
54.	List the different methods tunnel construction in hardrock and explain any one method with neat sketch.
55.	Explain different types of tunnel lining.
56.	Describe drainage in tunneling.
57.	State methods of tunneling in soft rock. Explain withsketch any one

Course Coordinator

(C. R. Limkar)

Machine Learning Question Bank

Short Questions

1. Explain Supervised type of learning with examples.
2. Explain Unsupervised type of learning with examples.
3. Explain Reinforcement type of learning with examples.
4. Differentiate between Learning versus Designing.
5. Explain Predictive tasks in Machine Learning.
6. Explain descriptive tasks in Machine Learning.
7. Differentiate between Deep learning vs Machine Learning.
8. What is concept of Binary Classification?
9. What is Feature in Machine Learning? Explain the different Feature types in brief.
10. Feature Construction and Transformation, Feature Selection
11. Explain the concept of Multiclass Classification.
12. Explain Regression in short.
13. Explain different types of Regression in short.
14. Explain the Neural Network Elements in short.
15. Explain Artificial Neural Network in short.
16. Explain the different Machine Learning Models in short.
17. Explain Email Spam and Malware Filtering in short.
18. Explain the Characteristics of Machine learning tasks.
19. Discuss various Examples of Machine Learning Problems.
20. Explain Multiclass Classification with examples.
21. Explain the Neural Network Elements in brief.
22. Explain the Rule Based Models.
23. Explain in detail Nearest Neighbours Classification.
24. Explain the application of machine learning as Image recognition.
25. What is Overfitting in Regression?
26. Explain VC Dimensions in brief.
27. Explain Basic Perceptron in brief.
28. Explain Least Squares method in brief.
29. Explain Regularized Regression in brief.
30. Explain Association rule mining in brief.
31. Explain the application of machine learning as Speech Recognition
32. Explain the application of machine learning as Traffic Prediction.
33. Explain Feature Construction in brief.
34. Explain Transformation in brief.
35. Explain the different elements of Decision Trees in brief.
36. Explain the Feed-Forward Network in brief.
37. Explain the Back Propagation Algorithm in brief.
38. Explain Overfitting in Regression in brief.
39. Explain Underfitting in Regression in brief.
40. Explain Neighbours and Examples in algebraic model in short.

Long Questions

1. Explain Feature Construction and Transformation in detail.
2. Explain Deep Learning in brief.
3. Differentiate between Deep learning vs Machine Learning with different parameters.
4. Explain different types of Regression in brief.
5. Explain Artificial Neural Network and its types in brief.
6. Explain the Decision Trees in detail.
7. Explain the Feed-Forward Network and Back Propagation Algorithm in brief.
8. Explain Binary Classification with examples.
9. Explain Multiclass Classification with examples.
10. Explain Overfitting and Underfitting in Regression in brief.
11. Explain Regularization theory in brief.
12. Explain Distance Based Models in brief.
13. Explain Rule Based Models in brief.
14. Explain Probabilistic Models in brief.
15. Explain Normal Distribution and Its Geometric Interpretations.
16. Explain Naïve Bayes Classifier in brief.
17. Explain Discriminative learning with Maximum likelihood in brief.
18. Explain the application of machine learning as Self-driving Cars.
19. Explain the application of machine learning as Virtual Personal Assistant.
20. Explain the application of machine learning as Medical Diagnosis.

Network Security Question Bank

Short Questions

1. Explain the Passive attacks in brief.
2. Explain the Active attacks in brief.
2. Explain the OSI security architecture.
3. Explain the security services in short.
4. Explain the security mechanisms in short.
5. Explain a model for Network Security in detail.
8. Explain the symmetric key cryptography.
9. Explain the Asymmetric key cryptography..
10. Diffentiate between symmetric and Asymmetric key.
11. What is Steganography?
12. Explain difference between conventional encryption and public key encryption
13. Explain the Caesar Cipher in brief.
14. Explain the Play fair Cipher in brief.
15. Explain the operation of DES.
16. What is the purpose of S-boxes in DES algorithm?
17. What is one way and trapdoor one way function
18. Discuss the strength of DES algorithm.
19. Explain Distribution of Public Keys.
20. Explain X.509 Certificates in short.
21. Explain IEEE 802.1X Port-Based Network Access Control Cloud Computing.
22. Explain Data Protection in the Cloud.
23. Discuss Cloud Security as a Service.
24. Discuss Intrusion Detection Systems along with Firewalls.
25. Discuss Secure Sockets Layer
26. Discuss Transport Layer Security
27. Explain Mobile Device Security.
28. Explain Wireless LAN Security.
29. Discuss Electronic Mail types in short**.**
30. Discuss Pretty Good Privacy
31. Discuss S/MIME
32. What is IPSec? List the application of IPSec.
33. Explain Transport mode of IPSec.
34. Explain Tunnel mode of IPSec.
35. Explain Encapsulating Security Payload.
36. Explain Combining Security Associations
37. Who are Cybercriminals?
38. Explain Cybercrime: The Legal Perspectives.
39. Explain Cybercrimes: An Indian Perspective.
40. Discuss Cybercrime and the Indian ITA 2000
41. Explain Social Engineering in short.

42. Explain the Virus and its types in short.
43. Explain the Worms and its types in short.
44. Explain the Key loggers and Spywares.
45. Explain the Trojan Horses and Backdoors.
46. Explain the DoS Attack in brief.
47. Explain the DDoS Attack in brief.
48. Explain SQL Injection. Describe steps for SQL Injection Attacks.
49. How to Prevent SQL injection attack?
50. Explain the Phishing in short.
51. Explain the Cloud computing in brief.

Long Questions

1. Explain Security Electronic Transaction (SET) protocol with diagram.
2. Explain SQL Injection. Describe steps for SQL Injection Attacks. How to Prevent SQL injection attack
3. Explain the block cipher mode of operation with diagram
   a) Electronic code book
4. Explain the block cipher mode of operation with diagram
   b) Cipher Block Chaining Mode
5. Explain the block cipher mode of operation with diagram
   c) Cipher Feedback Mode
6. Explain various substitution techniques in detail.
7. Explain the Active and Passive attacks.
8. Explain the working of DES with neat diagram.
9. Who are Cybercriminals? Explain the types of Cybercriminals.
10. Explain the Buffer Overflow and Buffer Overflow protection.
11. Discuss the difference between Virus and Worm.
12. Explain Classifications of Cybercrimes
13. Explain Cloud Security Risks and Counter measures.
14. Explain Symmetric Key Distribution Using Symmetric Encryption.
15. Explain Symmetric Key Distribution Using Asymmetric Encryption.
16. Explain RSA Algorithm with example.
17. Explain various substitution techniques in detail.
18. Explain various transposition techniques in detail.
19. Explain the DoS and DDoS Attacks
20. Explain Cybercrime: The Legal Perspectives and An Indian Perspective.

Optical Communication Question Bank

Short Questions

1. Explain the principle operation / concept of double heterojunction LED.
2. With B.D., Explain optical fiber communication system briefly.
3. With energy state diagram explain working of laser.
4. Explain structure of surface emitting LED.
5. Explain the various characteristics of LED.
6. Write a note on Edge emitting LED.
7. Explain the following terms:
   a. Quantum Efficiency b. Responsivity
8. Explain the concept of silicon reach through Avalanche Photodiode.
9. Explain the various parameters effecting the speed of response of detectors.
10. Explain the principle of p-i-n photodiode.
11. Explain EDFA.
12. Using simple ray theory, describe the mechanism for the transmission of light within an optical fiber.
13. Explain Critical angle in brief.
14. Explain Snell's law in brief.
15. Explain Refractive Index in brief.
16. Explain Acceptance angle in brief.
17. Explain the different types of rays in optical fiber.
18. Comparison between step index fiber and graded index fiber
19. Explain intrinsic absorption mechanism in fiber optics.
20. Explain extrinsic absorption mechanism in fiber optics.
21. Explain the advantages and disadvantages of LED.
22. Explain scattering losses observed in fiber optics.
23. What is dispersion? Compare dispersions in different types of fiber optics.
24. Briefly write about intramodal disposition occurred in fiber optics.
25. Briefly write about non-linear scattering losses observed in fiber optics.
26. What is dispersion? Compare dispersions in different types of fiber optics
27. Explain intrinsic and extrinsic absorption mechanism in fiber optics.
28. Define relative refractive index difference for an optical fiber and show how it may be related to the numerical aperture.
29. Explain about requirement of optical cable design.
30. Explain vapour phase deposition technique for preparing fiber optics.
31. Define Dispersion. Explain the technique for Multimode Fiber Dispersion measurement in the time domain.
32. Briefly write about connectors of fiber optics.
33. What are splices? Explain techniques for splicing.
34. Write a short note on WDM.
35. Explain SONET/SDH rings
36. Explain types of Optical Amplifiers
37. Explain the transmitter design for optical communication.
38. Explain OTDM.
39. Explain the different types of optical fibers.

40. Explain the different types of dispersion.
41. Briefly write about joint losses in optical fiber.
42. Explain any one method for fiber dispersion measurement.
43. Compare linear and non-linear scattering mechanism in fiber option.
44. Explain the different types of scattering mechanism.
45. Explain the applications of optical communication.
46. Briefly write about alignment losses.
47. Explain various characteristics of LED.
48. Explain Rayleigh scattering loss in optical fiber.
49. Explain the benefits and drawbacks of avalanche photodiode.
50. Explain the operation of Optical TDM. What are its advantages over Electrical TDM?

Long Questions

1. An optical fiber has a numerical aperture of 0.20 and a cladding refractive index of 1.59. Determine
    a. The acceptance angle for the fiber in water which has a refractive index of 1.33
    b. The critical angle at the core-cladding interface.

    {Ans: a) θa=8.6°, b) Øc=83.6°}

2. An optical fiber has a core refractive index of 1.50 and a cladding refractive index of 1.47. Determine
    a. Critical angle at the core cladding interface
    b. NA for the fiber
    c. Acceptance angle

    {Ans: a) Øc=78.5°, b) NA= 0.30, C) θa =17.4°}

3. Explain fiber alignment and joint loss with Fresnel reflection.

4. A long single mode optical fiber has an attenuation of 0.5 dB km^{-1} when operating at a wavelength of 1.3 μm. The fiber core diameter is 6 μm and the laser source bandwidth is 600 MHz. Compare the threshold optical powers for stimulated Brillouin and Raman scattering within the fiber at the wavelength specified.

    {Ans: a) P_B = 80.3mW, b) P_R=1.38W}

5. A step index fiber in air has a numerical aperture of 0.16, a core refractive index of 1.45 and a core diameter of 60 μm. Determine the normalized frequency for the fiber when light at a wavelength of 0.9 μm is transmitted. Further estimate the number of guided modes propagating in the fiber.

    (Ans: V (Normalized frequency) =33, M (No. of guided modes) =561)

6. An 11 km optical fiber link consisting of optimum near parabolic profile graded index fiber exhibits rms internal pulse broadening of 346 ps over its length. If the fiber has a relative refractive index difference of 1.5%. Estimate core axis refractive index and numerical aperture of the fiber.

    (Ans: =1.45, NA=0.25)

7. The velocity of light in the core of step index fiber is 2.01× m/s and critical angle at core cladding interface is 80°. Determine the numerical aperture and acceptance angle for the fiber in air, assuming it has core diameter suitable for the consideration by ray analysis. The velocity of light in vacuum is 2.998×10^8 m/s.

(Ans: NA= 0.263, θa=15.2°)

8. A 15 km optical fiber link uses fiber with loss of 1.5 dB/km. The fiber is jointed every kilometer with connectors which give an attenuation of 0.8 dB each. Determine the minimum mean optical power which must be launched into the fiber in order to maintain a mean power level of 0.3 μW at the detector.

(Ans: Pin= 703 μW)

9. The mean optical power launched into an optical fiber link is 1.5 mW and the fiber has an attenuation of 0.5 dB/km. Determine the maximum possible link length without repeaters when the minimum mean optical power level required at the detector is 2 μW.

(Ans: L= 57.5 km)

10. The threshold optical powers for stimulated Brillouin and Raman scattering in a long 8 μm core diameter single mode fiber are found to be 190 mW and 1.70 W respectively when using an injection laser source with a bandwidth of 1 GHz. Calculate the operating wavelength of the laser and the attenuation in decibels per kilometer of the fiber at this wavelength?

(Ans: λ=1.50 μm, αdB=0.30 dB/km)

11. A silica multimode step index fiber has a core refractive index of 1.46. Determine the optical loss in decibels due to Fresnel reflection at a fiber joint with:
    a. A small air gap
    b. An index matching epoxy which has a refractive index of 1.40.

(Ans: (a) 0.31 dB (b) 3.8 × 10^-4 dB)

12. A silica optical fiber with core diameter large enough to be considered ray theory analysis has a core refractive index of 1.50 and a cladding refractive index of 1.47. Determine
    a. The critical angle at the core-cladding interface.
    b. The NA for the fiber.
    c. The acceptance angle in air for the fiber.

(Ans: Øc = 78.5° NA = 0.30, θa = 17.4°)

13. A planar LED is fabricated from gallium arsenide which has a refractive index of 3.6
    a. Calculate the optical power emitted into air as a percentage of the internal optical power for the device when the transmission factor at the crystal-air interface is 0.68.
    b. When the optical power generated internally is 50% of the electrical power supplied, determine the external power efficiency.

(Ans: a) Pe =0.013Pint (b) ηep= 0.65%)

14. The phototransistor has a collector current 15 mA when the incident optical power at wavelength of 1.26 μm is 125 μW. Estimate optical gain of device, the common emitter current gain if the quantum efficiency of the base–collector photodiode at a wavelength of 1.26 μm is 40%.

(Ans: G0=118.1, hFE= 295.3)

15. The radiative and non-radiative recombination lifetimes of the minority carriers in the active region of a double-heterojunction LED are 60 ns and 100 ns respectively. Determine the total carrier recombination lifetime and the power internally generated within the device when the peak emission wavelength is 0.87 μm at a drive current of 40 mA.

(Ans: τ =37.5 ns, ηint = 0.625 , Pint = 35.6 mW)

16. With suitable sketches explain working principle of LASER.

17. Write a short note on ‘Optical Amplifiers’.
18. Explain SONET and SDH networks, rings.
19. Write a short note on semiconductor optical amplifiers.
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T.Y. Btech(Electrical) (Part-II) WEF June 2020
Optical Communication

Question Bank

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Question Bank

Course	Integrated M. Tech in Cosmetic Technology
Paper Code	HCT 4.3
Subject Name	Cosmetic Engineering – II
Class	2nd Year M.Tech. C.T.
Semester	IV

Q. No. Answer any four of the following (2 marks Questions)

1. Explain Conduction through Metal and Non- Metals.
2. What do you mean by forced convection?
3. How natural convection results in boiling of water.
4. Comment on driving force during conduction of heat through solid.
5. Write down the mathematical expression for Fourier's law.
6. Define film coefficient and resistance.
7. What do you mean by Natural Convection and Forced Convection.
8. What happens when radiation falls on any surface?
9. Elaborate black body.
10. Mention Stefan –Boltzmann law.
11. What is emissivity? Why emissivity is less than 1 for the body other than black body?
12. Define Heat exchangers and Heat Interchangers.
13. Depending on flow, classify heat exchangers.
14. Enlist different parts of shell and tube heat exchangers.
15. Define and classify direct contact type of heat exchangers.
16. Explain in short about direct transfer type of heat exchangers.
17. What are baffles?
18. Explain different modifications of Scrapped surface Heat Exchangers.
19. Write a note on finned tube.
20. Write down limitations of spiral Heat Exchangers.
21. Draw neat labelled diagram of SHE.
22. Define relative humidity.
23. Comment on relation between humidity and temperature.
24. What is dew point?
25. What is Pysychrometery?
26. Comment on enthalpy of a system.
27. Comment on humidity determination by gravimetric method.
28. Enlist different psychrometric process of industry.
29. What is material balance?
30. What do you mean by system?

Q. No. Write short notes (4 marks Question)

1. Elaborate Stoichiometric Balance.
2. What is dimensional analysis? Write down its advantages and disadvantages.

3. What is unit and Number? Write a note on Interconversions.
4. What do you mean by Shaft work and flow work?
5. Define i)Batch Process ii) Continuous process iii) Steady state iv) Unsteady state
6. What is rate of radiation? Comment on emissivity.
7. Explain in detail about heat exchangers.
8. Explain working of heat exchangers.
9. Comment on Direct contact heat exchangers.
10. Write down construction of liquid to liquid Heat interchangers.
11. Draw neat labelled diagram of Scrapped Surface Heat Exchangers.
12. Elaborate finned tube heat exchangers.
13. Write a note on spiral heat exchangers.
14. Write a note on important psychrometric properties.
15. Explain a section of Humidity chart.
16. Write in detail about sensible heating along with diagram.
17. Write in detail about sensible cooling along with diagram.
18. Explain mechanism of Humidification.
19. Why dehumidification is necessary?
20. Draw neat labelled diagram of dehumidifier.
21. What do you mean by centralised Air conditioning system.
22. Draw neat labelled diagram of Window Air conditioning system.
23. Write a note on Packaged Air condition system
24. Comment on heat transfer
25. Explain in detail about convection.
26. Write about Fourier's law and Stefan –Boltzmann law.
27. Explain Grey body in detail.
28. Draw neat labelled diagram of 1-2 exchanger.
29. Explain intensive variables and extensive variables.
30. Write about energy balances on closed system.

Q. No. Answer any one of the following (8 marks Questions)

1. Explain Stoichiometric Coefficient with example.
2. A solution of common salt in water is prepared by adding 20 kg of salt to 100 kg of water, to make a liquid of density 1323 kg m-3. Calculate the concentration of salt in this solution as a ....
(a) weight fraction,
(b) weight/volume fraction,
(c) mole fraction,
(d) molar concentration

3. a .If air consists of 65% by weight of nitrogen and 35% by weight of oxygen calculate:
(i) The mean molecular weight of air
(ii) The mole fraction of oxygen
b.Write a note on general balance equation.

4. a. Explain Basic principle of Material Balance.
b. Explain Batch process and continuous process.
5. Explain Shell tube heat exchanger in detail.
6. What do you mean by Direct and Indirect contact type of heat exchangers?
7. Explain Liquid to liquid interchangers in detail

8. Explain Air conditioning in detail.
9. Comment on determination of humidity.
10. Enlist various psychrometric process, elaborate sensible heating and sensible cooling in detail.

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Question Bank

Course	Integrated M. Tech in Cosmetic Technology
Paper Code	SCT 6.2
Subject Name	Pharmacology and Interaction – II
Class	3rd Year M.Tech. C.T.
Semester	VI

Q. No. Answer the following (2 marks Questions)

1. Define sensitization and Hypersensitivity.
2. Define occlusion area and erythema.
3. What do you mean by Allergic reaction and Repeated Insult Irritant?
4. Outline the method of Hand Immersion Test.
5. BUEHLER TEST- outlines the method.
6. What are cauterising agents and Primary Irritants?
7. Write down principle behind Skin Irritation Test.
8. Explain Bullae and Miliaria.
9. Write down the different tests to be carried out on different cosmetics.
10. Explain Test method for Oral Toxicity.
11. Describe symptoms of Morton's Neuroma.
12. Write down most common symptoms of planter fasciitis.
13. Comment on Night Splints.
14. Define Halux Valgus.
15. What are the causative factors for bunions?
16. What do you mean by neuropathic foot pain.
17. What is corn and callus?
18. Elaborate risk factors for dry heel fissure.
19. Write down the procedure for sample preparation and positive control for Human cumulative irritation test.
20. What do you mean by 'Angry Back'?
21. Comment on Indian Standards of cosmetics.
22. Comment on selection of haptens for Patch test.
23. Write down the test procedure for Patch Test.
24. Explain observation of Patch test according to International Contact Dermatitis Research group.
25. Explain mechanism of Photoallregy.
26. Comment on Sensitization phase.
27. What do you mean by Chemical burns?
28. Comment on Impaired Skin barrier function.
29. What is Xerosis and Icthyosis vulgaris.
30. What is Pityriasis alba.

Q. No. Write a note on (3 marks Questions)

1. What do you mean by Urticaria and Angiodema.
2. Write down classification of Urticaria.
3. Explain treatment of Urticaria.
4. Define serum sickness and write down its clinical signs.
5. Explain Pathophysiology of Serum Sickness.
6. Explain classification of Anaphylaxix.
7. Comment on drug allergy and Anphylaxix.
8. Write about aetiology of allergic rhinitis.
9. Write a short note on common cold.
10. Explain Type I allergy.
11. Write down methods of Immunofluroscence.
12. Write down different types of Agglutination reaction.
13. Define affinity, Avidity and Paratope.
14. Give graphical representation of Precipittation reaction.
15. Define serum, Antiserum and Serology.

Q. No. Answer the following (4 marks Question)

1. Explain Scale assessing for Skin Irritation Test.
2. Write down Primary Irritancy Test for BUEHLER TEST
3. Comment on Reporting of SKIN SENSITIZATION TEST ON GUINEA PIGS
4. Write down procedure for Skin Irritation Test.
5. Write down Observation and Scoring for Skin Irritation Test.
6. Write down result interpretation of Skin Irritation Test.
7. Define Exudation, Fissuring, Cauterising reaction, Cauterising agents.
8. Comment on Beuro of Indian Standards.
9. Comment on Treatment / Prevention of Planter Faciitis.
10. Explain in detail IgE.
11. What do you mean Polyclonal and Monoclonal antibodies?
12. What do you mean by Adjuvant and Antigenic determinant?
13. Explain Intermolecular forces of Ag-Ab interaction.
14. Comment on Immunofluroscence.
15. Write about Radial Immunodiffucion.
16. Explain Tube agglutination.
17. Comment on Blood grouping test.
18. Write down Indirect coombs test.
19. Write in detail about Widal test.
20. Draw schematic presentation of Coombs Test.
21. Explain Type I and Type II allergy.
22. Elaborate Cell mediated Hypersensitivity.
23. Comment on Allergic rhinitis.
24. Explain Sign and symptoms of allergic rhinitis.
25. Explain signs and symptoms of autoimmune haemolytic anaemia.

Q. No. Answer the following (5 marks Questions)

1. What is dermatitis? Explain procedure for Hand Immersion Test.
2. Write down assessment method for Skin Irritation test
3. Summarise observation of Skin Irritation test.
4. What do you mean by cross sensitization and challenge phase?
5. Explain Oral Toxicity limit test.
6. Explain Draize Test procedure in Rabbit
7. Explain structure of IgA
8. Write result an Interpretation of CFT.
9. Explain procedure involved in CFT.
10. Write short note on Autoimmune Haemolytic Anaemia.
11. What are the causative factors for bunions, explain treatment available for the same.
12. Define Serum Sickness and elaborate Pathophysiology involved.
13. Explain in detail about BIS. Enlist any 4 chemicals / hapten of Indian Standard Allergen Battery.
14. Comment on Sensitization phase and challenge phase.
15. Define and classify anaphylaxix.

Q. No. Answer the following (6 marks Questions)

1. Define Urticaria classify along with treatment available.
2. Elaborate Precipitation reaction
3. Comment on dominant form of Immunoglobulin
4. Comment on Pentavalent Immunoglobulin
5. Explain specificity and Binding site of antigen-antibody reaction.
6. What do you mean by Angry Back and explain reasons for false negative patch test.
7. Explain Principle and assessment of Skin Irritation test.
8. Explain in detail about Immunofluroscence.
9. What do you mean by Adjuvant, Antigenic determinant and Complement?
10. What is agglutination reaction, explain its types.

Q. No. Answer the following (6 marks Questions)

1. Write down principle behind Skin Irritation Test. Also elaborate assessment of Skin Irritation test.
2. What is precipitation reaction? Explain procedure involved in CFT.
3. Write about aetiology of allergic rhinitis. Elaborate Type IV Hypersensitivity.
4. What is neurom? Explain Mortons Neuroma explain the treatment and prevention of Mortons Neuroma.
5. What do you mean by cross sensitization and challenge phase? Enlist the factors responsible for false negative patch test.
6. Write a note on Gel precipitation, Slide precipitation test.
7. What is allegy? Enlist common factors responsible for allergy? Explain any one disease classified under Type I hypersensitivity in detail.
8. Explain in detail photosensitive eczema.
9. Elaborate foot pain in detail.
10. What is atopic dermatitis? Explain the treatment available for Atopic dermatitis.

11. Explain Baboons syndrome.
12. Comment on agglutination reaction
13. Explain serum sickness in detail
14. Define antigen, adjuvant and complement. Explain Immunofluroscence in detail.
15. Explain diagnostic test for contact hypersensitivity.

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Question Bank

Course	Integrated M. Tech in Cosmetic Technology
Paper Code	SCT 8.1
Subject Name	Management and Organizational behaviour
Class	4th Year M.Tech. C.T.
Semester	VIII

Q. No. Answer the following (2 marks Questions)

1. Write down the purpose of management.
2. Comment on Administration.
3. Management is Science as well as Art, Explain?
4. Write a short node on First level management.
5. Write about Prof. Charles Babbage contribution to evolution of management thoughts.
6. Comment on purpose of planning.
7. Write a short note on organizing
8. Define and explain different types of authority.
9. What do you mean by centralization of power?
10. Write down the advantages of departmentation by territory
11What do you mean by Cause and effect diagram.
12. Define controlling.
13. Explain Break even analysis.
14. Comment CPM and PERT as controlling technique.
15. Define and classify activity.
16. What is quality circle? Enlist the structural organization for Quality Circle.
17. Write a short note on steering committee.
18. Explain Brain storming.
19. What do you mean by Muda of waiting?
20. Write a short note on Need.
21. Comment on Self-Actualisation needs.
22. Explain Reinforcement theory
23. Comment on financial incentives.
24. Write about disadvantages of job enlargement.
25. Comment on inspiration.

Q. No. Write a note on (3 marks Questions)

1. Explain advantages of Job Enrichment
2. Comment on Motivation.
3. Differentiated between financial and non financial incentives.
4. What do you mean Equity theory?
5. What is standardisation?
6. Elaborate cause and effect diagram

7. Comment on members of quality circles.
8. What is Network?
9. Write down limitations of controlling.
10. Define and state objectives of planning.
11. What do you mean by strategic planning?
12. What do you mean by tactical planning?
13. Define Planning also enlist purpose of management.
14. Share your view, Management as a Science.
15. Write about James Watt Junior contribution to evolution o management thoughts.

Q. No. Answer the following (4 marks Question)

1. Differentiate CPM and PERT.
2. Write Techniques of Controlling.
3. Define management and write down its characteristics.
4. What do you meant by Scientific approach, write down employer's criticism.
5. Write a note on scalar chain.
6. What do you mean by Unity of direction and spirit the corps?
7. Write a short not on modern approach.
8. What do you mean by contingency approach of management?
9. Define group and write down the characteristics of formal group.
10. Differentiate between formal and informal group.
11. Explain Balance theory.
12. Explain Exchange theory.
13. Justify, Organizing is multistep process.
14. Comment on Power
15. What do you mean by Authority?
16. Elaborate PERT.
17. Define quality Circle, Write about facilitator.
18. Define and write down the characteristic of Quality Circle.
19. Explain Role of Non members in Quality circle.
20. Explain i) Brainstorming ii) Pareto Analysis.
21. Write a short note on Motivation.
22. Elaborate process of motivation.
23. Write down importance of motivation.
24. Write Alderfer's ERG Theory
25. Differentiate between Motivation and Inspiration.

Q. No. Answer the following (5 marks Questions)

1. Explain Informal groups.
2. Comment on nature of planning.
3. Write in detail about process of control.
4. Write in short about KAIZEN
5. Explain Different types of Muda as per KAIZEN.
6. Explain Methods of Motivation.
7. What is Job Enlargement?
8. Share your view, Management as an Art.
9. Enlist different controlling techniques; explain any 2 techniques in short.

10. Differentiate between Job Enlargement and Job Enrichment.
11. Explain Expectancy theory.
12. Explain McClelland's Achievement Model.
13. Explain in detail Herzberg's Theory.
14. Write down characteristic of management in detail.
15. What do you mean by levels of management, explain top level management.

Q. No. Answer the following (6 marks Questions)

1. Elaborate float in detail.
2. Explain PERT as Controlling Technique.
3. Explain Structural Organization of Quality Control in detail
4. What do you mean by KAIZEN?
5. Elaborate Need and Motivation in detail.
6. Explain in detail Nature of Motivation.
7. Elaborate Characteristics of Motivation in detail.
8. Explain McClelland's Achievement Model and Alderfer's ERG Theory.
9. Define Controlling, Planning and Quality Circle. Comment on Non-Members of Quality Circles.
10. Define Management and elaborate contingency approach of management.

Q. No. Answer the following (7 marks Questions)

1. Define Team, Explain in detail about Explain Informal groups.
2. What do you mean by breakeven point? Differentiate between CPM and PERT.
3. Define Planning; Explain Nature and Purpose of Planning.
4. What do you mean by Management by objective? Explain modern approach.
5. Define Motivation and Explain different methods of Motivation in detail.
6. Write in detail about formal and Informal group.
7. Explain Scalar chain, Parito analysis and breakeven point.
8. Explain in detail about delegation of Authority.
9. Elaborate Problems related with delegation of Authority.
10. Departmentation by Consumer type and territory, Explain.
11. Explain Centralization of Power.
12. What do you mean by decentralization of Power?
13. Define Management and elaborate nature of Management.
14. Write down the drawback of Scientific Management.
15. Write down different functions of Management.

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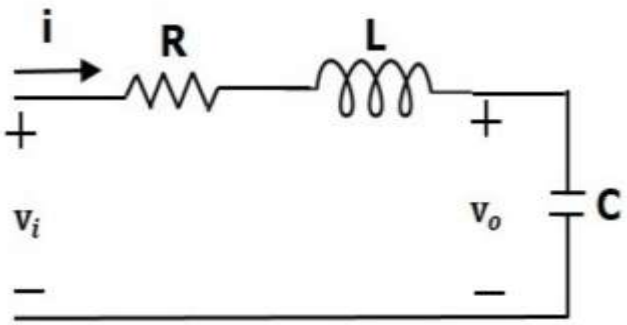
Punyashlok Ahilyadevi Holkar Solapur University,Solapur
Department Electrical Engineering
Class :- T. Y. B. Tech. (EE) Sem-I

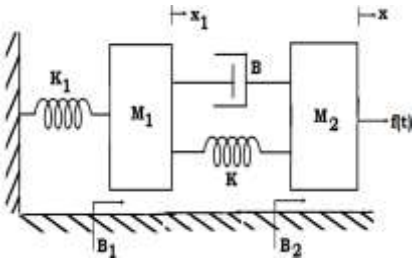
Subject : Linear control system

Question Bank (LCS)

1. Define transfer function. Find the transfer function of RLC series circuit, consider output accross capacitor .
2. Define transfer function. Find the transfer function of below system .

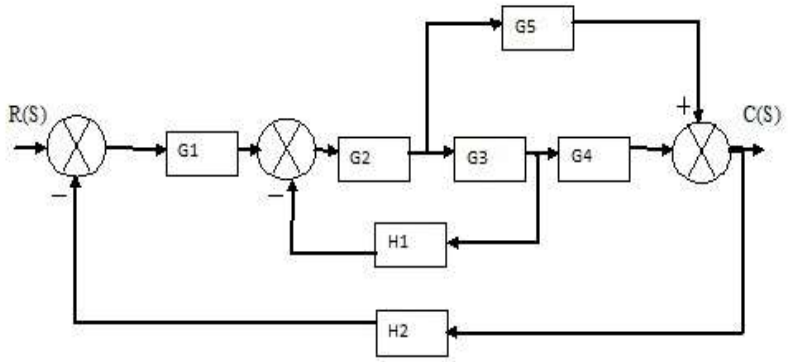


3. Explain different types of control systems
4. Give the comparison between open loop and closed loop system.
5. Classify the types of control system?
6. Compare the difference between the open loop and closedloop system?
7. Write the analogous electrical elements in force voltage analogy for the f mechanical translational system
8. Derive the F-V and F-I analogy with neat diagram.
9. List the basic elements of translational mechanical systems
10. Explain any four block diagram reduction rules.
11. Explain F-V analogy
12. Explain F-I analogy
13. Inspect the given system and derive the differential equations governing the system

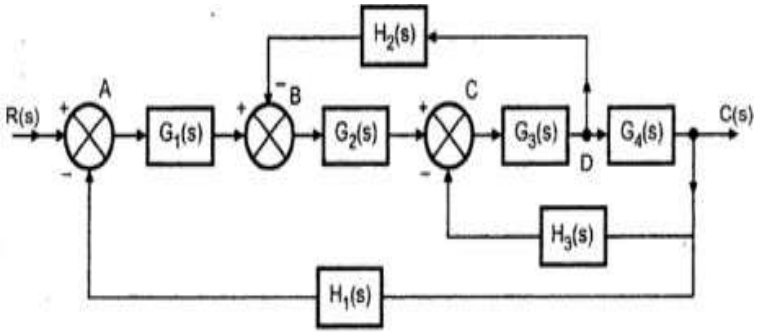


14. Write Masons Gain formula
15. Explain terminologies used in signal flow graph.

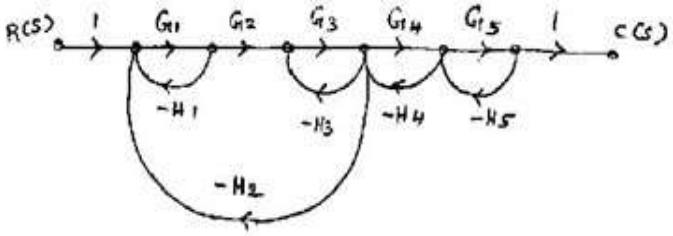
16. Reduce the block diagram using reduction rules and obtain C(s)/R(s)



17. Reduce the block diagram shown in figure below and determine the transfer function

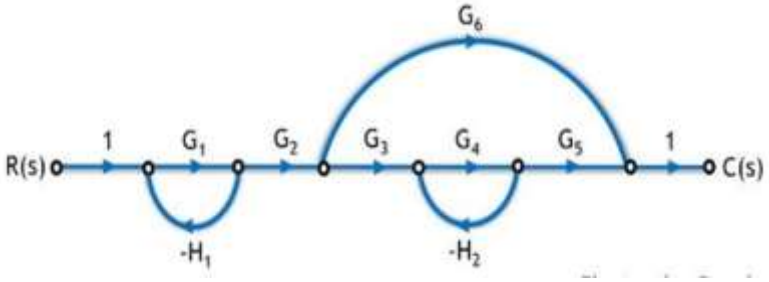


18. Obtain the closed loop transfer function of the systems , by using Mason‟s gain formula.



19. Explain the effect of feedback on system parameter variations of control system

20. Find the transfer function of the system shown by SFG as below



21. List out the time domain specifications
22. Find all the time domain specifications for a unity feedback control system whose open loop transfer function is given by G(S) = $\mathbf{25 / S(S+5)}$
23. A second order system is given by C(s)/R(s) = $\frac{25}{s^2+6s+25}$. Find its rise time, peak time, peak overshoot and settling time
24. Explain the standard test signals used in control system.
25. How the system is classified depending on the value of damping ratio?
26. What are the different types of controllers?
27. Write the necessary and sufficient condition for the stability in Routh Stability criterion.
28. How stability is related to location of pole? Explain in detail
29. What is centroid? How the centroid is calculated?
30. Determine the range of K for stability of unity feedback system using Routh stability criterion whose transfer function

    $C(S) / R(S) = K / S(S^2 + S + 1)(S+2) + K$
31. Explain briefly about the steps to be followed to construct a root locus plot of a given transfer function
32. Explain the Angle criteria and magnitude criteria for root locus.
33. For a unity feedback system ,G(s)= $\frac{K}{s\,(s+4)(s+2)}$

    Sketch the rough nature of the root locus showing all details on it.
34. With the help of Routh's stability criterion find the stability of the following systems represented by the characteristic equations:

    $s^4 + 8s^3 + 18s^2 + 16s + 5 = 0$
35. Define phase margine ?
36. What is phase and gain cross over frequency?
37. For A unity feed back control systems G (S) = K / S (S + 4) (S + 1 0) Draw the BODE plot.
38. What are the frequency domain specifications?
39. For unity feedback system having

    G(s) = $\frac{10\,(s+1)}{s2\,(s+2)(s+10)}$

    Determine i) Type of System ii) Error coefficient iii) steady state error for input as $1+4t+t^2/2$
40. Demonstrate the correlation between time and frequency response
41. What is minimum phase system?
42. Write the definition for peak overshoot?
43. Define transient and steady state response
44. Sketch the response of a second order under damped system?
45. Discuss about the positional error constant.
46. Define order of a system

47. Name the various standard test signals? Draw thecharacteristics diagram and obtain the mathematicalrepresentation of all.
48. Write the response of undamped second order system for unit step input.

With a step input of 12 units, for a unity feedback controlsystem which has an open loop transfer function $G(s) = 10/s(s+2)$ Find

i) Rise time ii) Percentage overshoot iii) Peak time iv) Settling time

49. Find the static error constants for a unity feedback systemhaving a forward path transfer function $G(s) = 50 \;/\; G(s) = s(s+10)$
50. For the transfer function $G(s) = 50 \;/\; G(s) = s(s+10)$, interpret the steady state errors of the system for the input $r(t) = 1 + 2t + t^2$
51. Measurements conducted on a servo mechanism show that the system response to be $c(t) = 1 + 0.2e^{-60t} - 1.2e^{-10t}$ when subjected to a unit step input. Obtain an expression for closed loop transfer function
52. Define Phase margin & gain margin.
53. Using Routh Criterion, check the stability of the system represented by the characteristic equation $s^4+8s^3+18s^2+16s+5=0$.
54. What is block diagram? What are the elements of block diagram?
55. What are the basic elements of mechanical rotational systems? Write its force balance equation.
56. Explain the advantages & disadvantages of open loop system.
57. Explain the advantages & disadvantages of closed loop system
58. What is feedback? What type of feedback is employed in control systems?
59. How the system is classified depending on the value of damping ratio?
60. How a control system is classified depending on the value of damping ratio ?
61. Write the necessary and sufficient condition for the stability in Routh Stability criterion.
62.

T.Y. B. Tech (Mechanical): Part I

Subject: Professional Elective-III (B) Industrial Hydraulics and Pneumatics

Question Bank

Section – I

Questions (6 marks)

1. Define actuator. Explain with neat sketch and symbol tandem cylinder.
2. Explain working of telescopic cylinder with neat sketch and symbol in hydraulics.
3. What are different materials used for seals? Explain suitability of these seal materials for different conditions.
4. Explain construction & working of gear type of hydraulic rotary actuator.
5. Explain construction & working of vane type of hydraulic rotary actuator.
6. Explain construction & working of 4/2 spool type direction control valve.
7. Explain main characteristics curves of centrifugal pump.
8. Explain construction and working of pressure compensated flow control valve.
9. Explain construction and working of pilot operated sequence valve in hydraulics.
10. Explain different types of intensifiers with neat sketches.
11. Write a note on circuit with intensifier.
12. Write a note on circuit with accumulator.
13. Explain with neat sketch bleed of circuit in hydraulics.
14. Explain in detail the regenerative circuit in hydraulic application.
15. Explain hydraulic clamping circuit.

Questions (4 marks)

1. Explain cylinder cushioning effect in hydraulic system.
2. Explain the importance of seals. Classify the seals used in hydraulic system.
3. Explain advantages of hydraulic systems.
4. Explain construction & working of any one type of hydraulic rotary actuator.
5. What are different shapes of seals used? Explain with neat sketches.
6. What are fluid power systems? State applications of hydraulic systems.

7. What is difference between single acting & double acting cylinder? Give conditions where these types of cylinders are suitable.
8. Explain limitations of hydraulic systems.
9. Explain construction and working of vane type pump.
10. Explain with neat sketch hydraulic intensifier.
11. Explain with neat sketch working of 3/2 spool type direction control valve.
12. Explain construction & working of weight loaded accumulator.
13. Explain construction & working of spring loaded accumulator.
14. Explain construction & working of air or gas type accumulator.
15. Show that velocity of piston is lesser & force is more during forward stroke than that of during return stroke of piston.
16. Explain construction & working of unloading valve.
17. Explain construction & working of counterbalancing valve.
18. Explain construction & working of pressure reducing valve.
19. Explain different methods of actuation of spool in case of direction control valves.
20. Explain various arrangements of spool centre positions.
21. Explain construction & working of one way valve.
22. What are different functions of an accumulator used in hydraulic system?
23. Explain hydraulic circuit for sequencing of two cylinders.
24. Write a note on hydraulic braking system in automobiles.
25. Explain in detail meter-in circuit.
26. Explain in detail meter-out circuit.
27. Explain counterbalancing circuit.
28. Explain synchronizing circuit.
29. Compare hydraulic meter in circuit with meter out circuit.
30. Explain simple hydraulic circuit.

Section –II

Questions (6 marks)

1. Draw and explain any four symbols in pneumatics system.
2. What is actuator? Explain with sketch double acting cylinder with double end rod.
3. Compare air motor with electric motor.
4. Explain with a sketch construction & working of the gear type air motor.
5. Explain construction & working of vane type air motor.
6. What is FRL unit? Explain with a neat sketch construction & working of air lubricator.
7. Explain with neat sketch time delay valve.
8. Write short note on quick exhaust valve.
9. Sketch and explain pilot operated pressure relief valve with symbol.
10. Explain in detail 5/3 direction control valve in pneumatics.
11. Describe with neat sketch working of pneumatic clamping system.
12. Explain with neat sketch pneumatic meter out circuit of speed control.
13. Draw a neat labeled sketch of the braking system used in railway wagons & explain it.
14. Explain a circuit for speed control of piston during both strokes.
15. Write a note on pneumatic power tools.

Questions (4 marks)

1. Write comparison between pneumatic and hydraulic systems.
2. Explain advantages of pneumatic systems.
3. Explain various applications of pneumatic systems.
4. Explain limitations of pneumatic systems.
5. Explain construction & working of pneumatic single acting cylinder.
6. Explain construction & working of pneumatic double acting cylinder.
7. What are components of a pneumatic system? Explain functions of any two components.
8. Draw symbol of FRL unit & 5/3 direction control valve.
9. Classify the air compressors. Explain selection criteria of compressor.
10. Explain in detail 5/2 direction control valve in pneumatics.
11. Explain construction & working of air filter.

12. Explain construction & working of air regulator.
13. What are different materials used for pneumatic pipes? Give the pressure ratings of these materials.
14. Write a note on piping layout.
15. Explain construction & working of two way flow control valves used in pneumatic system.
16. Explain construction & working of one way flow control valves used in pneumatic system.
17. Explain construction & working of 3/2 seat type valve.
18. Compare seat type of direction control valves with spool type of direction control valves.
19. Draw a neat labeled sketch of 2 stage reciprocating compressor.
20. Explain construction & working of vane type air compressor.
21. Explain construction & working of lobe type air compressor.
22. Explain construction & working of centrifugal air compressor.
23. Differentiate between meter in and meter out circuit in pneumatics.
24. Explain with neat sketch time delay circuit in pneumatics.
25. Explain pneumatic braking system.
26. Explain with neat sketch pneumatic meter in circuit of speed control.
27. Out of meter in & meter out circuit which is preferred in case of pneumatic circuit? Explain the reason in detail.
28. Write a note on a circuit with quick exhaust valve.
29. Explain a circuit for speed control of piston during forward stroke only.
30. Explain a simple pneumatic circuit with pneumatic motor.

Third Year B.Tech. Mechanical w.e.f. June 2020
Professional Elective – IV : Project Management
w.e.f. June 2020
Question Bank

1. Define a project. Explain characteristics of a project
2. Give classification of different types of projects
3. Explain need and benefits of project management
4. Explain process of project management
5. Write a note on Project life cycle
6. Explain role and importance of a project manager
7. Explain feasibility study techniques used in project management
8. Explain importance of risk management in overall project management
9. Explain steps in risk management
10. Explain Payback Period, Return on Investment, Net Present Value, Internal rate of Return
11. Explain Break Even Analysis
12. Explain Scoring Models
13. Explain various terms used in Project Cost Estimation
14. Explain jobbing cost estimation method
15. Explain cost estimation by Factoring method
16. Explain cost estimation by Inflation method
17. Explain cost estimation by Unit Rates method
18. Explain analogous cost estimation method
19. Explain parametric cost estimation method
20. Explain Bottom-Up cost Estimating,
21. Explain process of Three-Point Estimates,
22. Explain Monte Carlo Simulation,
23. Explain in detail Project Budgeting,
24. Explain importance of Resource Allocation and
25. Describe Cost Forecasts
26. Explain need of project planning
27. Describe project life cycle in detail with example
28. Explain project planning process
29. Explain work breakdown structure
30. Explain development of a project network
31. Explain time estimation
32. Explain the critical path with example
33. Explain PERT Model
34. Explain Measures of variability
35. Explain CPM Model
36. Explain purpose of project execution and control
37. Explain project control process
38. Explain Project Management Information System (PMIS)
39. Explain planning of PMIS
40. Explain design of PMIS
41. Explain project performance measurement
42. Explain measurement of productivity

43. Describe project performance evaluation in detail
44. Explain Benefits and Challenges of Performance Measurement and Evaluation
45. Explain need of controlling the projects
46. Explain various features in MS project
47. Explain advantages of using MS tools in project management
48. Explain project cost estimation and project scheduling with example
49. Explain importance of resource planning in project management
50. Explain the different models used in project estimation
51. What are different steps of planning risk ?
52. Explain different sub-stages in identifying project scope and objectives.
53. What are different methods to visualize the progress of a project ?
54. What is risk management ? Explain risk management activities.
55. What is project ? What are different activities of management ?
56. Explain the review process in detail in project execution and closure.
57. Explain the concept of measurement and project tracking.
58. Write step wise project planning activates.
59. With suitable example explain Monte Carlo simulation and critical path concepts
60. Draw the flow chart of project control cycle and explain.