SLR-JH-177

Seat No.	

Set P

M.Sc. (Semester - I) (CBCS) Examination Oct/Nov-2019
Electronic Science
SEMICONDUCTOR DEVICES

Day & Date: Monday, 18-11-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of nonprogrammable calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) Which of the following compound or element not used in LEDs?
   a) CaO b) GaP
   c) GaAs d) all of the above

2) In intrinsic semiconductor, Fermi level is _____.
   a) close to the conduction band
   b) close to the valence band
   c) in between conduction band and valence band
   d) at infinity

3) _____ silicon is very pure silicon obtained by vertical zone melting.
   a) Float-zone b) Neutron transmitted
   c) RTP d) High vacuum

4) Johnson noise is due to _____.
   a) the fluctuations of carriers in the dark
   b) the quantization of the charge
   c) along the photon path
   d) none of above

5) Which of the following having trivalent impurity?
   a) Boron b) Gallium
   c) Aluminium d) All of the above

6) The noise in a p-i-n device is _____ that in a photoconductor.
   a) lower than b) higher than
   c) equal to d) independent

7) Net movement of charge due to an electric field is called _____.
   a) Mobility of carrier b) Carrier Drift
   c) Diffusion of carrier d) Conductivity

8) In _____ scattering a carrier moving through the crystal is scattered by a vibration of the lattice.
   a) non-uniform b) impurity
   c) lattice d) uniform

9) The p-n junction formed within a single semiconductor is called _____.
   a) homo junction b) heterojunction
   c) both homo and hetero junction d) junction tail

10) A JFET is also called _____ transistor.
   a) unipolar b) bipolar
   c) uni-junction d) none of the above

11) _____ allows independent measurement of the minority carrier mobility μ and diffusion coefficient D.
   a) HTP b) hall effect
   c) Haynes-Shockley Experiment d) etching

12) Width of depletion layer is _____ with forward bias.
   a) increases b) decreases
   c) remains the same d) zero

13) Distribution coefficient k_d of doping is the ratio of the _____.
   a) concentration of the impurity in the liquid C_L to the solid Cs
   b) concentration of the impurity in the solid Cs to the liquid C_L
   c) reaction temperature Tr to the absorb temperature Ta
   d) absorb temperature Ta to the reaction temperature Tr

14) MIS-FET is _____.
   a) Metal insulator semiconductor FETs
   b) Metal inductor semiconductor FETs
   c) MOS-ideal Si FETs
   d) metal inductor silicon FET

Q.2 A) Answer the following questions. (Any Four) **08**
1) Explain n-type semiconductor.
2) What is mobility of electron?
3) Give a brief emitter crowding of BJT.
4) Draw the plane (1 1 ∞) and direction [1 1 ∞]·
5) What is Photolithography?

B) Write Notes. (Any Two) **06**
1) Electrons and holes
2) P-N Junction breakdown
3) Kronig – Penney model

Q.3 A) Answer the following questions. (Any Two) **08**
1) Calculate the maximum packing fraction of simple cubic structure.
2) Give a brief account of direct and indirect band-gap.
3) What is the ion implantation?

B) Answer the following questions. (Any One) **06**
1) Explain high electron mobility transistor.
2) Explain the effects of temperature on mobility with lattice and impurity scattering.

Q.4 A) Attempt any two of the following question. **10**
1) What is contact potential of p-n junction. Explain in brief.
2) Explain diffusion of carriers with suitable sketch.
3) Give brief explanation on construction of MISFET.

B) Answer the following questions. (Any One) **04**
1) What is avalanche breakdown?
2) A Si bar 0.1 cm long and 100 μm^2 in cross-sectional area is doped with 10^{17} cm^{-3} phosphorus. Find the current at 300 K with 10 V applied.

Q.5 Answer the following questions. (Any Two) **14**
a) Explain all steps of bulk crystal growth from melt process.
b) What is Hall Effect? Give brief explanation with suitable sketch.
c) Explain heterojunctions of metal semiconductor junctions with suitable diagram.

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Seat No.	

Set P

M.Sc. (Semester - I) (CBCS) Examination Oct/Nov-2019
Electronic Science
NETWORK ANALYSIS AND SYNTHESIS

Day & Date: Tuesday, 05-11-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) The circuit is said to be in resonance if the current is ____ with the applied voltage.
   a) in phase
   b) out of phase
   c) 45^0 out of phase
   d) 90^0 out of phase

2) The expression of resonant frequency in a series resonant circuit is?
   a) $1/(2\pi\sqrt{C})$
   b) $1/(2\pi\sqrt{L})$
   c) $2\pi\sqrt{LC}$
   d) $1/(2\pi\sqrt{LC})$

3) If the ratio of the polynomial P (s) and its derivative gives a continued fraction expansion with _____ coefficients, then the polynomial P (s) is Hurwitz.
   a) all negative
   b) all positive
   c) Positive or negative
   d) positive and negative

4) The roots of the odd and even parts of a Hurwitz polynomial P (s) lie on _____.
   a) right half of s plane
   b) left half of s-plane
   c) on jω axis
   d) on σ axis

5) The condition for maximum power to be transferred to the load is _____.
   a) Source resistance equal to load resistance
   b) Source resistance greater than load resistance
   c) Source resistance greater than or equal to load resistance
   d) Source resistance less than load resistance

6) In a series circuit having resistance and inductance, the quality factor is _____.
   a) ωL/R
   b) R/ωL
   c) ωL
   d) R

7) For the reciprocity theorem to satisfy the ratio of response to excitation before and after the source is replaced should be _____.
   a) different
   b) same
   c) before source is replaced is greater than after the source is replaced
   d) before source is replaced is less than after the source is replaced

8) The circuit which satisfies reciprocity theorem is called _____.
   a) Short circuit
   b) Open circuit
   c) Linear circuit
   d) Non-linear circuit

9) The dual pair of KCL is _____.
   a) KVL
   b) current
   c) voltage
   d) Current source

10) Tellegen's Theorem is valid for _____ network.
   a) linear or non-linear b) passive or active
   c) time variant or time invariant d) all the above

11) Laplace transform changes the ____ domain function to the _____ domain function.
   a) time, time b) time, frequency
   c) frequency, time d) frequency, frequency

12) The unit step is not defined at t = _____.
   a) 0 b) 1
   c) 2 d) 3

13) Two ports containing sources in their branches are called _____.
   a) three port b) one port
   c) passive ports d) active ports

14) Kirchhoff's voltage law is based on principle of conservation of _____.
   a) energy b) momentum
   c) mass d) charge

Q.2 A) Answer the following. (Any Four) **08**

1) State Kirchoffs Voltage Law.
2) State maximum power transfer theorem.
3) What is reciprocity theorem?
4) Define the terms: node and mesh.
5) What is waveform synthesis?

B) Write Notes. (Any Two) **06**

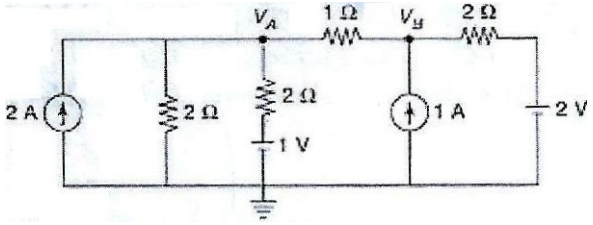
1) Explain the steps to be followed in mesh analysis.
2) Explain the behavior of R, L and C in series resonant circuit.
3) Obtain the Laplace Transform of unit ramp signal.

Q.3 A) Answer the following. (Any Two) **08**

1) State and prove the frequency integration theorem of Laplace Transform.
2) Obtain the initial conditions of the network for capacitor and inductor.
3) Prove that polynomial P(s) is not Hurwitz. P(s) = $S^4+S^3+2S^2+3S+2$.

B) Answer the following. (Any One) **06**

1) Derive an expression for resonant frequency of a parallel tank circuit.
2) Find V_A and V_B for the network shown below.



Q.4 A) Answer the following. (Any Two) **10**

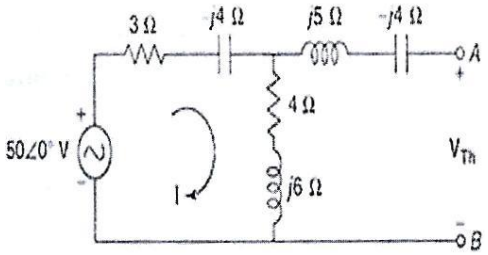
1) Describe variation of impedance with frequency of parallel resonant circuit.
2) Test whether the given polynomial P(s) = $s^4+7s^3+6s^2+21s+8$ is Hurwitz by routh array.
3) Determine the Quality factor of series resonant circuit for inductor.

B) Answer the following. (Any One) **04**

1) State and prove final value theorem of Laplace Transform.
2) Compare: Series resonance and parallel resonance.

Q.5 Answer the following. (Any Two) **14**

a) Obtain Thevenin's equivalent network between terminals A and B.



b) Derive an expression for bandwidth of series resonant circuit.

c) Explain any two removal operations of elementary synthesis concepts.

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Seat No.	

Set P

M.Sc. (Semester - I) (CBCS) Examination Oct/Nov-2019
Electronic Science
COMMUNICATION SYSTEMS

Day & Date: Thursday, 07-11-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) A carrier signal has _____.
   a) constant amplitude b) varying amplitude
   c) frequency above 20 KHz d) none

2) In FM, the change in carrier frequency is proportional to what attribute of the modulating signal?
   a) amplitude b) frequency
   c) angle d) tone

3) The circuit that has the function of demodulating the frequency modulated signal is _____
   a) detector b) AFC
   c) discriminator d) envelop detector

4) In FM, the amplitude of the modulated frequency wave at all times remains _____
   a) dependent b) varying
   c) high d) constant

5) One of the advantages of base modulation over the collector modulation of a transistor class C amplifier is _____
   a) lower modulating power required
   b) higher power output per transistor
   c) better efficiency
   d) better linearity

6) ASK is rarely used in modems because _____
   a) it shifts only between ON and OFF states
   b) it is highly susceptible to noise
   c) it takes care of amplitude only
   d) none of these

7) The binary values are represented by two different frequencies in _____
   a) ASK b) PSK
   c) FSK d) DPSK

8) The process of adding intelligence on the carrier is called _____
   a) adding b) mixing
   c) detection d) modulation

9) The PAM signal can be detected by _____
   a) low pass filter b) high pass filter
   c) band pass filter d) band stop filter

10) The main advantage of TDM over FDM is that, it _____
a) needs less power b) gives better S/N ration
c) Needs less BW d) needs simple circuit

11) Multiplexing means _____
a) one input, many outputs b) many inputs and many outputs
c) one output and many inputs d) none of the above

12) What is the category of data transmission, if the binary pulse is maintained for the entire bit time?
a) unipolar b) bipolar
c) non-return to zero d) return to zero

13) Probability of error in DPSK is _____ PSK
a) less than b) more than
c) comparable to d) incomparable to

14) In full duplex communication system, the flow of information takes place in both directions _____
a) alternatively b) simultaneously
c) bit by bit d) none of the above

Q.2 A) Answer the following questions. (Any Four) **08**
1) What is meant by sideband transmission?
2) What is a frequency doubler?
3) Define high level modulation.
4) What is meant by delta modulation?
5) Explain duplex communication system.

B) Write Notes. (Any Two) **06**
1) How PPM can be generated from PWM signals? Explain.
2) PLL as FM detector.
3) Quantization of signal

Q.3 A) Answer the following questions. (Any Two) **08**
1) Explain the process of PDMA.
2) Give a brief explanation on FDM.
3) Describe a transponder.

B) Answer the following questions. (Any One) **06**
1) Give a brief explanation of demodulator of PTM.
2) Give a brief explanation on cross talk in TDM.

Q.4 A) Answer the following questions. (Any Two) **10**
1) State and explain, Sampling theorem.
2) Explain, frequency doubler and tripler circuits.
3) Explain the working of an AM detector circuit.

B) Answer the following questions. (Any One) **04**
1) Write the advantages of FM over AM.
2) Write a brief note on asynchronous transmission.

Q.5 Answer the following questions. (Any Two) **14**
1) With a neat diagram, explain pulse amplitude modulation and demodulation.
2) With a neat diagram, explain DPSK modulation and demodulation.
3) Write a detailed note on multiple access techniques.

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Seat No.	

Set P

M.Sc. (Semester – I) (CBCS) Examination Oct/Nov-2019
Electronic Science
MICROCONTROLLERS AND INTERFACING

Day & Date: Saturday, 09-11-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) Which is not type of thermocouple _____.
   a) A b) E
   c) J d) K

2) The Tachometers are used to measure _____.
   a) Speed b) Frequency
   c) PWM d) All of these

3) The tacho-generators are _____ device.
   a) electronic b) computerized
   c) Electro-chemical d) Electro-mechanical

4) What do you mean by micro in microcontroller?
   a) Distance between 2 IC's b) Distance between 2 transistors
   c) Size of a controller d) Distance between 2 pins

5) Name the architecture and the instruction set for microcontroller.
   a) Van-Neumann Architecture with CISC Instruction Set
   b) Harvard Architecture with CISC Instruction Set
   c) Van-Neumann Architecture with RISC Instruction Set
   d) Harvard Architecture with RISC Instruction Set

6) SCON in serial port is used for which operation?
   a) Transferring data b) Receiving data
   c) Controlling d) Controlling and transferring

7) Program counter stores what?
   a) Address of before instruction
   b) Address of the next instruction
   c) Data of the before execution to be executed
   d) Data of the execution instruction

8) What is inverting order of the assembly and running 8051 program?
   i) Myfile.asm
   ii) Myfile.lst
   iii) Myfile.obj
   iv) Myfile.hex
   a) i, ii, iii, iv b) ii, iii, i, iv
   c) iv, iii, ii, i d) iii, ii, i, iv

9) Which pin provides a +Vcc option in 8051?
   a) Pin 10 b) Pin 18
   c) Pin 20 d) Pin 40

10) For a D/A converter, the resolution required is 50m V add the total maximum input is 10 V. The number of bits required is _____.
   a) 7 b) 8
   c) 9 d) 20

11) A D/A converter has 5V full scale output voltage and an accuracy of ±0.2%. The maximum error for any output voltage will be?
   a) 5 mV b) 10 mV
   c) 20 mV d) 25 mV

12) An electrical resistor whose resistance is greatly reduced by heating, used for measurement and control?
   a) LDR b) Thermocouple
   c) Thermistor d) All of these

13) _____ is a satellite-based radio-navigation system owned by the United States government.
   a) GSM b) GPS
   c) Both a, b d) None of these

14) _____ is a cellular network, which means that cell phones connect to it by searching for cells in the immediate vicinity.
   a) GSM b) GPS
   c) Both a, b d) None of these

Q.2 A) Answer the following questions. (Any Four) **08**

1) Write short note on port0 and port2 of 8051.
2) Write short note on SCON register.
3) What is need of interfacing?
4) What is shaft encoder/rotary encoder?
5) Short note on accelerometer?

B) Write notes. (Any Two) **06**

1) Discuss timer/counter of 8051.
2) Discuss operation of matrix keyboard.
3) Short note PS2 keyboard

Q.3 A) Answer the following questions. (Any Two) **08**

1) Explain serial communication in 8051.
2) Explain servo motor and its application?
3) Short note thermocouple.

B) Answer the following questions. (Any One) **06**

1) Explain ADC interfacing with 8051.
2) Interface opto-coupler and switch to the 8051, control coupler-output interfaced switch.

Q.4 A) Answer the following questions. (Any Two) **10**

1) Discuss the ports of 8051.
2) Explain the interfacing of SY-HS 220.
3) Explain in brief 16*2 LCD.

B) Answer the following questions. (Any One) **04**

1) Find out execution time of following program if crystal of 11.0592 MHz?

```
DELAY : MOV R3, #300
HERE  : NOP
        NOP
        NOP
        DJNZ R3, HERE
        RET
```

2) Write assembly or C program for running of 8 LEDs which interfaced to P1 of 8051.

Q.5 Answer the following questions. (Any Two) **14**

a) Discuss serial data transmission to PC from 8051 controller.

b) Explain interfacing Thermocouple with 8051.

c) Discuss interfacing of accelerometer interfacing with microcontroller.

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Seat No.	

Set P

M.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Electronic Science
CONTROL SYSTEMS

Day & Date: Monday, 04-11-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) In a signal flow graph, nodes are represented by small _____.
   a) Circles b) Squares
   c) Arrows d) Pointers

2) Root locus specifies the movement of closed loop poles especially when the gain of system _____.
   a) Remains constant b) Exhibit variations
   c) Gives zero feedback d) Gives infinite poles

3) In open loop system _____.
   a) the control action depends on the size of the system
   b) the control action depends on system variables
   c) the control action depends on the input signal
   d) the control action is independent of the output

4) The capacitance, in force-current analogy, is analogous to _____.
   a) momentum b) velocity
   c) displacement d) mass

5) _____ technique gives quick transient and stability response.
   a) Root locus b) Bode
   c) Nyquist d) Nichols

6) The laplace transform of unit step signal is _____.
   a) 1/s b) 1
   c) $1/s^2$ d) $1/s^3$

7) Controller with a proportional term and a derivative term is called _____ controller.
   a) PI b) P
   c) PD d) PID

8) From Routh's criterion all the terms in the _____ column of Routh's array must have same sign.
   a) first b) second
   c) third d) fourth

9) A system is said to be _____ if its roots lies on the left half of the s-plane.
   a) unstable b) stable
   c) marginally stable d) both b and c

10) _____ is the frequency domain specification.
   a) Resonant peak b) Rise time
   c) Delay time d) Settling time

11) Which of the following is exhibited by Root locus diagrams?
   a) The poles of the transfer function for a set of parameter values
   b) The bandwidth of the system
   c) The response of a system to a step input
   d) The frequency response of a system

12) Roots on the imaginary axis makes the system _____.
   a) Stable b) Unstable
   c) Marginally stable d) Linear

13) The overall transfer function of two blocks in parallel are:
   a) Sum of individual gain b) Product of individual gain
   c) Difference of individual gain d) Division of individual gain

14) Laplace transform of unit impulse signal is :
   a) A/s b) A
   c) 1 d) 1/s

Q.2 A) Answer the following questions. (Any Four) **08**

1) Define transfer function?
2) What are the types of compensator?
3) What are the basic components of control system?
4) What is SISO and MIMO?
5) What is root locus?

B) Write Notes. (Any Two) **06**

1) Distinguish between open loop and closed loop system.
2) Write a note on electrical analogy?
3) Explain the advantages of P-I controller over proportional controller.

Q.3 A) Answer the following questions. (Any two) **08**

1) What is lead compensation?
2) Define the following terms:
   i) Branch
   ii) Loop
   iii) Forward path
   iv) Non - touching loop
3) What is Stability? Define various terminologies of the same: relative, marginal and absolute.

B) Answer the following questions. (Any One) **06**

1) Using Routh criterion determine the stability of the system whose characteristics equation is $S^6 + S^5 - 2S^4 - 3S^3 - 7S^2 - 4S - 4 = 0$.
2) Explain the steps followed in signal flow graph with a suitable example.

Q.4 A) Answer the following questions. (Any Two) **10**

1) Consider the system with G(s).H(s) = K/S (S+2) (S+4). Find whether S = -1+ j4 is on root locus or not using angle condition.
2) What are frequency domain specifications?

B) Answer the following questions. (Any One) **04**

1) Derive an expression for transfer function of first order system.
2) Write a note on classification of control system.

Q.5 Answer the following questions. (Any two) **14**

a) Explain the following controller with its advantages.
1) ON-OFF
2) Proportional

b) What is transfer function? Derive an expression for it using LTI differential equation.

c) Explain design of Tacho-generators with its transfer function and draw its block diagram.

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Seat No.	

Set P

M.Sc. (Semester - II) (CBCS) Examination Oct/Nov-2019
Electronic Science
DIGITAL ELECTRONICS AND VHDL

Day & Date: Wednesday, 06-11-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non programmable calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below. 14

1) Flip- Flops can store _____.
   a) 1-bit data b) 2-bit data
   c) 3-bit data d) 4-bit data

2) The figure of merit of a logic family is given by _____.
   a) Gain-bandwidth product
   b) Product of propogation delay time and power dissipation
   c) Product of fan-out
   d) None of these

3) A combinational circuit is one, whose output depends on _____.
   a) Past input b) Present input
   c) both a and b d) None of these

4) Which of the following is standardized as IEEE 1364?
   a) C b) C++
   c) FORTRAN d) Verilog

5) Who developed the Verilog?
   a) Moorby b) Thomas
   c) Russell and Ritchie d) Moorby and Thomson

6) To serially shift a nibble (four bits) of data into a shift register, there must be _____.
   a) one clock pulse
   b) four clock pulses
   c) eight clock pulses
   d) one clock pulse for each 1 in the data

7) Operator which precedes the operand _____.
   a) Unary b) Binary
   c) Ternary d) None

8) Turn off delay means, gate output transition to _____.
   a) 1 b) 0
   c) z d) x

9) Which of the following is a superset of Verilog?
   a) Verilog b) VHDL
   c) System Verilog d) System VHDL

10) State reduction gives _____.
   a) Reduction in number of flip-flops
   b) Number of flip-flops remain same
   c) Either a or b
   d) None of these

11) A divide by 20 ring counter requires a minimum of _____.
   a) Twenty flip-flops b) Eight flip-flops
   c) Five flip-flops d) None of these

12) PAL refers to _____.
   a) Programmable Array Loaded b) Programmable Logic Array
   c) Programmable Array Logic d) None of the Mentioned

13) A Karnaugh map (K-map) is an abstract form of _____ diagram organized as a matrix of squares.
   a) Venn Diagram b) Cycle Diagram
   c) Block diagram d) Triangular Diagram

14) FPGA is to _____.
   a) digital logic design b) analog design
   c) DC design d) AC

Q.2 A) Answer the following questions. (Any Four) **08**

1) What is verilog HDL?
2) What are the different data types in verilog?
3) What is Demultiplexer?
4) What is state reduction?
5) Define gate level modelling.

B) Answer the following questions. (Any Two) **06**

1) What is parity checker?
2) Write a note on case statement in Verilog.
3) Write a Verilog code for J-K flip-flop.

Q.3 A) Answer the following questions. (Any Two) **08**

1) What is PLD?
2) Design priority encoder with its truth table.
3) Briefly explain lexical conventions in verilog.

B) Answer the following questions. (Any One) **06**

1) Design full adder using K map and realize it using basic gates.
2) Explain state table reduction and state assignment technique using the state table given below.

Present State	Next State		Output (z)	
	Input(x)		Input(x)	
	X = 0	**X = 1**	**X = 0**	**X = 1**
A	A	B	0	0
B	D	C	0	1
C	F	E	0	0
D	D	F	0	1
E	B	G	0	0
F	G	C	0	1
G	A	F	0	0

Q.4 A) Answer the following questions. (Any Two) **10**

1) Differentiate Mealey and Moore machine with exact diagram.
2) Explain in detail behavioural modelling in Verilog with suitable example.
3) What is decoder? State its various types.

B) Answer the following questions. (Any One) **04**

1) Write a Verilog code for the D FF using behavioral modeling style.
2) Design and implement 4-bit comparator with its truth table.

Q.5 Answer the following questions. (Any Two) **14**

a) Design 4-bit Johnson counter using J-K flip flop with its timing diagram.

b) Explain different operators in Verilog HDL with one example each.

c) Write a Verilog code for the following using behavioral modeling style.

1) 3:8 decoder
2) AND gate

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Seat No.	

Set P

M.Sc. (Semester – II) (CBCS) Examination Oct/Nov-2019
Electronic Science
PIC MICROCONTROLLER

Day & Date: Friday, 08-11-2019 Max. Marks: 70
Time: 11:30 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) The PIC18F4550 has _____ bit ADC with _____ number of channels.
   a) 8, 10 b) 10, 10
   c) 10, 13 d) 10, 15

2) The PIC18F4550 has in built flash program memory _____ bytes.
   a) 128 b) 256
   c) 16K d) 32K

3) The operating frequency for PIC18F4550 is _____.
   a) 24 MHz b) 16 MHz
   c) 12 MHz d) 04 MHz

4) In multiplication of two bytes in the PIC18, one of the operand must be in the _____ register and the second operand must be a literal value K.
   a) W b) File
   c) both (a) and (b) d) none of the above

5) PIC18xxx instructions is _____ bits wide.
   a) 08 b) 16
   c) 32 d) 04

6) The general purpose RAM and SFRs are together are called _____.
   a) W register b) File register
   c) Status register d) None of these

7) Which of the following files can be produced by the text editor?
   a) myprog.asm b) myprog.hex
   c) myprog.o d) myprog.lst

8) All the instructions in the PIC18 either _____or _____ byte instructions.
   a) 1,2 b) 2.3
   c) 2,4 d) 1,3

9) To make PORT B an output port, we must place _____ in register _____.
   a) FFH, TRISB b) FFH, Status Register
   c) 00H, TRISB d) 00H, Status Register

10) TMR2IF and TMR3IF are part of registers _____.
   a) PIE1 and PIR1 respectively b) PIE1 and PIE2 respectively
   c) PIE2 and PIR1 respectively d) PIR1 and PIR2 respectively

11) For LCD to recognize information at the data pins as data _____.
   a) $\mathrm{RS} = 1, \mathrm{E} = \mathrm{H} - \mathrm{to} - \mathrm{L}\ \mathrm{and}\ \mathrm{R}/\overline{\mathrm{W}} = 0$
   b) $\mathrm{RS} = 0, \mathrm{E} = \mathrm{L} - \mathrm{to} - \mathrm{H}\ \mathrm{and}\ \mathrm{R}/\overline{\mathrm{W}} = 0$
   c) $\mathrm{RS} = 0, \mathrm{E} = \mathrm{H} - \mathrm{to} - \mathrm{L}\ \mathrm{and}\ \mathrm{R}/\overline{\mathrm{W}} = 0$
   d) $\mathrm{RS} = 1, \mathrm{E} = \mathrm{L} - \mathrm{to} - \mathrm{H}\ \mathrm{and}\ \mathrm{R}/\overline{\mathrm{W}} = 0$

12) Which register is used to choose the timer for the compare mode?
   a) T1CON b) T3CON
   c) CCP1CON d) PIR1

13) A stepper motor with a step-angle of 5 degree has _____ steps per revolution.
   a) 10 b) 24
   c) 36 d) 72

14) SPI means _____.
   a) Serial Peripheral Interrupt
   b) Synchronous Peripheral Interrupt
   c) Serial Priority Interrupt
   d) Serial Peripheral Interface

Q.2 A) Answer the following (Any Four) **08**

1) What does the term embedded system means?
2) What is the largest value that can be moved into an 8-bit register? What is the decimal equivalent of that hex value?
3) Find the C and DZ flag bits after the following addition

```
M0VLW   9FH
ADDLW   16H
```

4) Show how to represent decimal 99 in formats of hex and binary in the PIC assembler.
5) What is the ROM address space for the PIC18? At what location do we store the first opcode of a PIC18 program?

B) Answer the following (Any Two) **06**

1) Draw and explain the status register of PIC18xxx.
2) Explain the following instructions of PIC18.
   i) INCSNZ fileReg, d
   ii) XORWF fileReg, d
3) Explain the SFRs of the PIC18 family.

Q.3 A) Answer the following (Any Two) **08**

1) Explain the following directives
   i) LIST
   ii) END
2) Explain the program memory organization of PIC18.
3) Explain the Harvard architecture in the PIC18.

B) Answer the following (Any One) **06**

1) Write a assembly language program for addition of numbers 79H, F5H and E2H. Store the result in fileReg locations 5 (lower byte) and 6 (higher byte).
2) Assuming XTAL = 10MHz, write a program to generate a square wave of 50 Hz frequency on Pin PORTB.7. Use Timer0 in 16 bit mode with the prescaler = 128.

Q.4 A) Answer the following (Any Two) **10**

1) Explain Timer1 with the help of block diagram.
2) Draw and Explain the register format of ADCON0 and ADCON1.
3) Explain the brown-out reset in PIC18.

B) Answer the following (Any One) **04**

1) Draw the block diagram of Capture Mode in PIC18.
2) Write down the steps to be followed for programming in the capture mode.

Q.5 Answer the following (Any two) **14**

a) Interface stepper motor to PIC18. Write a assembly language program for one clockwise full rotation.

b) Write a program to transmit the message “BEST’’ serially at 4800 baud, 8-bit data, and 1 stop bit. Assume XTAL =10 MHz.

c) Interface DAC to PIC18. Write assembly language program to generate a square wave.

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Seat No.	

Set P

M.Sc. (Semester – III) (CBCS) Examination Oct/Nov-2019
Electronic Science
DIGITAL SIGNAL PROCESSING

Day & Date: Monday, 18-11-2019 Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) What is the set of all values of z for which $X(z)$ attains a finite value?
   a) Radius of convergence b) Radius of divergence
   c) Feasible solution d) None of the mentioned

2) What is the ROC of the signal $x(n) = \delta(n-k), k > 0$?
   a) $z = 0$ b) $z = \infty$
   c) Entire z-plane, except at $z = 0$ d) Entire z-plane, except at $z = \infty$

3) What is the ROC of the system function $H(z)$ if the discrete time LTI system is BIBO stable?
   a) Entire z-plane, except at $z = 0$ b) Entire z-plane, except at $z = \infty$
   c) Contain unit circle d) None of the mentioned

4) What is the circular convolution of the sequences $x1(n) = \{2,1,2,1\}$ and $x2(n) = \{1,2,3,4\}$?
   a) $\{14,14,16,16\}$ b) $\{16,16,14,14\}$
   c) $\{2,3,6,4\}$ d) $\{14,16,14,16\}$

5) How many complex multiplications are need to be performed for each FFT algorithm?
   a) $(N/2)\log N$ b) $N\log_2 N$
   c) $(N/2)\log_2 N$ d) None of the mentioned

6) In Overlap add method, what is the length of the input data block?
   a) L-1 b) L
   c) L+1 d) None of the mentioned

7) The direct form realization is often called a transversal or tapped-delay-line filter.
   a) True b) False

8) Which of the following is the first method proposed for design of FIR filters?
   a) Chebyshev approximation b) Frequency sampling method
   c) Windowing technique d) None of the mentioned

9) The lack of precise control of cutoff frequencies is a disadvantage of which of the following designs?
   a) Window design b) Chebyshev approximation
   c) Frequency sampling d) None of the mentioned

10) The values of cutoff frequencies in general depend on which of the following?
   a) Type of the window
   b) Length of the window
   c) None of the mentioned
   d) Both of the mentioned

11) In the Bilinear Transformation mapping, which of the following are correct?
   a) All points in the LHP of s are mapped inside the unit circle in the z-plane.
   b) All points in the RHP of s are mapped outside the unit circle in the z-plane.
   c) Both a & b
   d) None of the mentioned

12) In IIR Filter design by the Bilinear Transformation, the Bilinear Transformation is a mapping from _____.
   a) Z-plane to S-plane
   b) S-plane to Z-plane
   c) S-plane to J-plane
   d) J-plane to Z-plane

13) The odd part of a signal x(t) is: _____.
   a) $\mathrm{x(t) + x(-t)}$
   b) $\mathrm{x(t) - x(-t)}$
   c) $(1/2)^{*}\big(\mathrm{x(t) + x(-t)}\big)$
   d) $(1/2)^{*}(\mathrm{x(t) - x(-t)})$

14) If a signal $x(n)$ is passed through a system to get an output signal of $\mathrm{y(n) = x(n+1)}$, then the signal is said to be: _____.
   a) Delayed
   b) Advanced
   c) No operation
   d) None of the mentioned

Q.2 A) Answer the following questions. (Any Four) **08**

1) Find the z-transform of the finite duration signal $x(n) = \{-1,2,3,5,6\}$ ↑
2) Prove the time shifting property of DFT.
3) Draw the linear phase structure for the function $\mathrm{H(Z) = 1 + 3Z^{-1} + 2Z^{-2} + 3Z^{-3} + Z^{-4}}$
4) Verify the given system is linear or not? $\mathrm{y(n) = a.x(n) + b.}$
5) State sampling theorem.

B) Write Notes. (Any Two) **06**

1) Overlap save method
2) Classification of signals
3) Quantization

Q.3 A) Answer the following questions. (Any Two) **08**

1) Find DFT of $\mathrm{x(n) = \{1,2,2,1\}}$.
2) Draw the direct form II structure for the system.
$$\mathrm{y(n) + y(n-1) - 4\,y(n-3) = x(n) + 3\,x(n-2)}$$
3) Sketch following signals by performing operations on the signal given by $\mathrm{x(n) = \{1,3,-1,4,1,1\}}$
   a) $\mathrm{x(n+2)}$
   b) $\mathrm{1.5\,x(2n/3)}$

B) Answer the following questions. (Any One) **06**

1) Find circular convolution of $\mathrm{x(n) = \{1,1,2,2\}}$ and $\mathrm{h(n) = \{3,1,1,3\}}$
2) Find convolution using overlap add method for $\mathrm{x(n) = \{1,2,-1,2,3,-2,-3,-1,1,1,2,-1\}}$ and $\mathrm{h(n) = \{1,2,1\}}$

Q.4 A) Answer the following questions. (Any Two) **10**

1) Apply bilinear transformation to $H(S) = \frac{s^2+4.525}{s^2+0.692s+0.504}$ with $T = 1$ sec and find $H(Z)$.
2) Find linear convolution using circular convolution of the sequences $x(n) = \{1,2,3,1\}$ and $h(n) = \{1, -1\}$.
3) Compare circular convolution with linear convolution.

B) Answer the following questions. (Any One) **04**

1) Prove any two properties of z-transform.
2) Differentiate FIR and IIR filter.

Q.5 Answer the following questions. (Any Two) **14**

a) Design an ideal low pass filter with a frequency response

$$H_d(e^{jw}) = 1 \text{ for } -\frac{\pi}{2} \leq W \leq \frac{\pi}{2}$$
$$= 0 \text{ for } \frac{\pi}{2} \leq |W| \leq \pi$$

Find the values for h(n) for N = 11

b) Design an ideal band pass filter with a frequency response

$$H_d(e^{jw}) = 1 \text{ for } \frac{\pi}{4} \leq |W| \leq \frac{3\pi}{4}$$
$$= 0 \text{ otherwise}$$

Find the values for h(n) for N = 11

c) Find 8-point DFT using DIF- FFT algorithm for the given sequence

$$x(n) = \{1,2,3,4,4,3,2,1\}$$

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Seat No.	

Set P

M.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Electronic Science
MICROWAVE ELECTRONICS AND APPLICATIONS

Day & Date: Tuesday, 05-11-2019 Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) The tangential components of ____ are continuous across the boundaries.
   a) electric flux density b) electric field intensity
   c) magnetic field intensity d) magnetic flux density

2) The tangential components of ____ are discontinuous at boundaries by an amount equal to surface charge density.
   a) electric flux density b) electric field intensity
   c) magnetic field intensity d) magnetic flux density

3) If line is properly matched to its characteristics impedance at each terminal, its efficiency can reach _____.
   a) zero b) infinite
   c) minimum d) maximum

4) The microwave transmission line can be analyzed by ____ theory.
   a) Distributed circuit b) Maxwell's field
   c) both a, b d) none of these

5) The distance between two successive maxima or minima is _____.
   a) λ b) $\lambda/2$
   c) $\lambda/4$ d) $\lambda/8$

6) The dominant mode in a particular guide is the mode having the ____ critical frequency.
   a) zero b) infinite
   c) highest d) lowest

7) The type of loss/es in rectangular waveguide is/are ____ loss.
   a) dielectric b) guide walls
   c) dielectric and guide walls d) none of these

8) X band frequencies from _____.
   a) 1 to 2 GHz b) 2 to 4 GHz
   c) 4 to 8 GHz d) 8 to 16 GHz

9) The following is/are limitation/s of conventional vacuum tubes.
   a) lead inductance b) inter-electrode capacitance
   c) transit angle d) all of these

10) The efficiency of two cavity klystron is ____%.
   a) 40 b) 41
   c) 42 d) 43

11) The helix TWT consist _____.
   a) electron beam and slow wave structure
   b) electron beam
   c) slow wave structure
   d) cavities only.

12) Which of the following is not a type of RADAR?
   a) Mono-pulse b) TWS
   c) Modulated d) Mechanical scan

13) Which magnetron known as conventional magnetron?
   a) Split-anode b) TWT
   c) Cylindrical d) Inverted

14) Which of the following is not microwave application?
   a) Satellite communication b) Wireless communication
   c) FM communication d) RF heating-annealing

Q.2 A) Attempt any four of the following question. **08**

1) Define characteristic impedance with its general equation in transmission line.
2) What is HERP and HERO?
3) What is propagation constant, transmission coefficient?
4) Short note on advantages of microwave.
5) What is concept of velocity and current modulation?

B) Write Notes. (Any Two) **06**

1) BARRIT diode
2) Directional coupler with their characteristic.
3) Line admittance and line impedance

Q.3 A) Attempt any two of the following question. **08**

1) Explain circular and rectangular cavity resonators.
2) Derive equation for magnetic force when electron in magnetic field?
3) Short note on radiation hazard limits of microwave.

B) Attempt any one of the following question. **06**

1) Discuss microwave frequency bands with their application area.
2) Write a short note on Hybrid ring, circulator, and directional coupler.

Q.4 A) Attempt any two of the following question. **10**

1) Discuss Maxwell's equations in differential and integral forms.
2) Explain the strip-lines in detail.
3) Discuss pulsed radar and duplexer.

B) Attempt any one of the following question. **04**

1) A load of $Z_L = 150 + j75\ \Omega$ terminates with $75\ \Omega$ line, what are the load admittance and the input admittance if the line is 0.15λ long?
2) Calculate breakdown power (Rectangular waveguide), if dimensions 3 cm x 1.5 cm in domain mode at 4 GHz.

Q.5 Attempt any two of the following question. **14**

a) Derive equation for single stub matching, compare it with double stub.
b) Derive the solution of field equation for circular waveguide.
c) Explain working of Travelling Wave Tube (TWT).

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Seat No.	

Set P

M.Sc. (Semester - III) (CBCS) Examination Oct/Nov-2019
Electronic Science
DATA COMMUNICATION AND NETWORKING

Day & Date: Thursday, 07-11-2019 Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) Adding 1 and 1 in modulo-2 arithmetic results in _____.
   a) 0 b) 1
   c) 2 d) None of the above

2) Which topology requires a multipoint connection?
   a) Bus b) Star
   c) Mesh d) Ring

3) A _____ is a data communication system within a building, plant, or campus, or between nearby buildings.
   a) LAN b) MAN
   c) WAN d) None of the above

4) HDLC is an acronym for _____.
   a) Half-duplex digital link combination
   b) Host double-level circuit
   c) High-duplex line communication
   d) High-level data link control

5) ____ control refers to a set of procedures used to restrict the amount of data that the sender can send before waiting for acknowledgment.
   a) Flow b) Error
   c) Transmission d) None of the above

6) The inner core of an optical fiber is _____ in composition.
   a) Copper b) Glass or plastic
   c) Bimetallic d) Liquid

7) Data from a computer are ____; the local loop handles ____ signals.
   a) analog; analog b) digital; digital
   c) digital; analog d) analog; digital

8) Bit stuffing means adding an extra 0 to the data section of the frame when there is a sequence of bits with the same pattern as the _____.
   a) trailer b) flag
   c) header d) none of the above

9) The Simplest Protocol and the Stop-and-Wait Protocol of elementary data link control are for ____ channels.
   a) noiseless b) noisy
   c) either (a) or (b) d) neither (a) nor (b)

10) UDP and TCP are both ____ layer protocols.
   a) Data link b) Network
   c) Transport d) None of the above

11) In _____ the chance of collision can be reduced if a station senses the medium before trying to use it.
   a) CSMA b) MAC
   c) CDMA d) FDMA

12) TCP/IP model does not have _____ layer but OSl model have this layer.
   a) Session b) Transport
   c) Application d) None of the mentioned

13) In virtual circuit network each packet contains ____.
   a) full source and destination address
   b) a short VC number
   c) only source address
   d) only destination address

14) Network congestion occurs _____.
   a) in case of traffic overloading
   b) when a system terminates
   c) when connection between two nodes terminates
   d) none of the mentioned

Q.2 A) Answer the following questions. (Any Four) **08**
1) Define Computer networks.
2) List out the categories of twisted pair.
3) Define network layer services.
4) Define Hub, Repeater, Switch and Router.
5) What is flow control?

B) Write Notes. (Any Two) **06**
1) Discuss on Transmission media.
2) What is elementary data link protocol? State its types.
3) State features of microwave transmission.

Q.3 A) Answer the following questions. (Any Two) **08**
1) Explain the types of frames in high level data link protocol (HDLC).
2) What is congestion? Explain congestion prevention policies.
3) Differentiate between ARP and RARP.

B) Answer the following questions. (Any One) **06**
1) Explain the static channel allocation problem.
2) With a neat tree diagram, explain DNS.

Q.4 A) Answer the following questions. (Any Two) **10**
1) What is OSI model?
2) Explain a simplex stop and wait protocol of elementary data link control.
3) Explain congestion control in virtual circuit network.

B) Answer the following questions. (Any One) **04**
1) Write a note on WAN.
2) Describe an error detection mechanism.

Q.5 Answer the following questions. (Any Two) **14**
a) What is TCP? Explain TCP protocol with its header format.
b) Discuss the following topologies
   a) Ring topology
   b) Star topology
c) Explain the following collision free protocol (Any one)
   i) Bit map protocol
   ii) Binary countdown protocol

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Seat No.	

Set P

M.Sc.(Semester - IV) (CBCS) Examination Oct/Nov-2019

Electronics Science

OPTIC FIBER COMMUNICATION

Day & Date: Monday, 04-11-2019 Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.

Q.1 Choose the correct alternatives from the following & rewrite the sentences. 14

1) The core of a fiber optic cable is made of
   a) Air b) Water
   c) Glass d) Plastic

2) To create an extrinsic semiconductor, what is done?
   a) Refractive index is decreased
   b) Doping the material with impurities
   c) Increase the band-gap of the material
   d) Stimulated emission

3) Which impurity is added to gallium phosphide to make it an efficient light emitter?
   a) Silicon b) Hydrogen
   c) Nitrogen d) Phosphorus

4) _____ is fully depleted by employing electric fields.
   a) Avalanche photodiode b) P-I-N diode
   c) Varactor diode d) P-N diode

5) The phenomenon leading to avalanche breakdown in reverse-biased diodes is known as _____.
   a) Auger recombination b) Mode hopping
   c) Impact ionization d) Extract ionization

6) _____ has more sophisticated structure than P-I-N photodiode.
   a) Avalanche photodiode b) P-N junction diode
   c) Zener diode d) Varactor diode

7) Core diameter of single mode step index fibers _____.
   a) 100 to 1000 μm b) 10 to 30 μm
   c) 2 to 10 μm d) 50 to 100 μm

8) A multimode step index fiber has a large core diameter of range.
   a) 100 to 300 μm b) 100 to 300 nm
   c) 200 to 500 μm d) 200 to 500 nm

9) Which of the following is not a technique for fabrication of glass fibers?
   a) 1960 b) 1963
   c) 1964 d) None of the above

10) The bandwidth of Multimode step index Fiber is.
   a) 2 to 30 MHz km b) 6 to 50 MHz km
   c) 10 to 40 MHz km d) 8 to 40 MHz km

11) Which materials are unsuitable for the fabrication of graded index fiber?
a) Glass-like materials b) Mono-crystalline structures
c) Amorphous material d) Silica based material

12) Which equations are best suited for the study of electromagnetic wave propagation?
a) Maxwell's equations b) Allen – Cahn equations
c) Avrami equations d) Boltzmann's equations

13) A permanent joint formed between two different optical fibers in the field is known as.
a) Fiber splice b) Fiber connector
c) Fiber attenuator d) Fiber dispersion

14) Which of the following is not a common type of fiber- optical cable?
a) Single – mode step-index b) Multimode graded-index
c) Single – mode graded – index d) Multimode step-index

Q.2 A) Answer the following questions. (Any Four) **08**

1) What is meant by intermodal dispersion?
2) Define Dispersion in Multimode Fiber. What is its effect?
3) State Snell's Law.
4) Explain durability and stability characteristics of optical fiber?
5) Calculate the Critical Angle, if n1=1.54 and n2=1.51.

B) Write Notes on (Any Two) **06**

1) Joints, splicer and couplers in optical fiber.
2) Explain optical fiber application in network, military and industry.
3) Fiber Drawing.

Q.3 A) Answer the following questions.(Any Two) **08**

1) Explain the differences between PN and PIN diodes.
2) Write a brief not on design optimization of single mode fibers.
3) Discuss the construction and characteristics of an avalanche photo diode.

B) Answer the following questions.(Any One) **06**

1) Explain how the Griffith theory is developed in order to predict the fracture stress of an optical fiber with an elliptical crack.
Silica has a Youngs modulus of 9x1010 Nm^{-2} and surface energy of 2.29J.
Estimate the structure stress in psi for a silica optical fiber with a dominant elliptical crack of depth 0.5 μm. Also, determine the strain of the break for the fiber (1psi=6894.76Nm^{-2}).
2) Discuss with necessary expressions that different types of noise that affect the performance of a photo detector.

Q.4 A) Answer the following questions.(Any Two) **10**

1) Derive expression for acceptance angle and numerical aperture with suitable sketch.
2) Draw and explain the LED structures based Double Heterostructure configuration.
3) Discuss the drawing of optical fibers from prepared glasses with regards to.
a) Multi-component Glasses. b) Silica rich glasses

B) Answer the following questions.(Any One) **04**

1) Draw and explain the operation of high impedance FET and BJT pre-amplifiers.
2) Explain the total internal reflection phenomenon.

Q.5 Answer the following questions.(Any Two) **14**

a) Explain the basic LED configurations used as optical source. Drive the expression for quantum efficiency and optical power generated in LED's.

b) A typical relative refractive index difference for an optical fiber designed for long distance transmission is 1%. Estimate the NA and the solid acceptance angle in air for the fiber when the core index is 1.46. Further, calculate the critical angle at the core-cladding interface within the fiber. It may be assumed that the concepts of geometric optics hold for the fiber.

c) Explain liquid-phase techniques in details for the preparation of optical fibers.

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Seat No.	

Set P

M.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Electronics Science
POWER ELECTRONIC

Day & Date: Wednesday, 06-11-2019 Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non programmable calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) Choppers converters _____.
   a) AC to DC b) DC to AC
   c) DC to DC d) AC to AC

2) Thyristor can be protected from over voltages by using _____.
   a) voltage clamping device b) fuse
   c) heat sink d) snubber circuit

3) Which device can be used in a chopper circuit?
   a) BJT b) MOSFET
   c) GTO d) All of the mentioned

4) The class A commutation or load commutation is possible in case of _____.
   a) dc circuits only b) ac circuits only
   c) both DC and AC circuits d) none of the above mentioned

5) In the principle of phase control _____.
   a) the load is on for some cycles and off for some cycles
   b) control is achieved by adjusting the firing angle of the devices
   c) control is achieved by adjusting the number of on off cycles
   d) control cannot be achieved

6) A single-phase half wave voltage controller consists of _____.
   a) one SCR is parallel with one diode
   b) one SCR is anti parallel with one diode
   c) two SCRs in parallel
   d) two SCRs in anti parallel

7) The type of commutation in which the pulse to turn off the SCR is obtained by separate voltage source is _____.
   a) class B commutation b) class C commutation
   c) class D commutation d) class E commutation

8) For a single phase thyristor circuit with R load & firing angle α, the conduction angle can be given by_____.
   a) $\pi + \alpha$ b) $2\pi + \alpha$
   c) $\pi - \alpha$ d) α

9) The self commutated by resonating the load is ____ forced commutation method.
   a) Class A b) class B
   c) class C d) class D

10) The local hot spot formation in the cross-section of the SCR is avoided by _____.
   a) reducing the junction temperature
   b) applying gate current nearer to the maximum gate current
   c) using only R loads
   d) proper mounting of the SCR on heat sink

11) The effect of over-voltages on SCR is minimized by using _____.
   a) RL circuits b) Circuit breakers
   c) Varistors d) di/dt inductor

12) If T is the time period for a chopper circuit and α is its duty cycle, then the chopping frequency is
   a) Ton/α b) Toff/α
   c) α/Toff d) α/Ton

13) An SCR is also known as _____.
   a) Triac b) Diac
   c) Unijunction transistor d) Thyristor

14) Comparing with the full wave rectifier using two diodes, the four diode bridge rectifier has the dominant advantage of _____.
   a) Higher current carrying
   b) Lower peak inverse voltage requirement
   c) Lower ripple factor
   d) Higher efficiency

Q.2 A) Answer the following. (Any Four) **08**
1) What are the different methods to turn off the thyristor?
2) List out the applications of SMPS.
3) What is the use of inductor in di/dt protection?
4) What is an AC controller?
5) Distinguish between diode rectifier and controlled rectifier.

B) Write Notes. (Any Two) **06**
1) Give working of SCR with a neat diagram.
2) What is snubber circuit?
3) Compare: SMPS and conventional power supply.

Q.3 A) Answer the following. (Any Two) **08**
1) Explain dv/dt protection circuits in detail.
2) Explain buck regulator with its neat diagram.
3) What is the difference between ON-OFF control and phase control?

B) Answer the following. (Any One) **06**
1) Explain AC on-off controller with its waveform.
2) Explain class A forced commutation circuits with its neat waveform

Q.4 A) Answer the following. (Any Two) **10**
1) With a neat circuit diagram, explain the principle of operation of a single phase half wave rectifier.
2) Explain how thyristors are protected against high di/dt?
3) Describe three phase half wave controlled rectifier with a neat diagram.

B) Answer the following (Any One) **04**
1) What are the different classes of forced commutation?
2) Write a note on impulse commutated chopper.

Q.5 Answer the following. (Any Two) **14**

1) Discuss about step down chopper with resistive load in detail.

2) Explain bidirectional controllers with R-L loads with its waveform.

3) With a neat diagram explain buck-boost regulator.

SLR-JH-192

Seat No.	

Set P

M.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Electronics Science
ADVANCED MICROCONTROLLER

Day & Date: Friday, 08-11-2019 Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Fill in the blanks by choosing correct alternatives given below. **14**

1) Which is the microcontroller used in Arduino UNO?
   a) ATmega328p b) ATmega2560
   c) ATmega32114 d) AT91SAM3x8E

2) What does p refer to in ATmega328p?
   a) Production b) Pico-Power
   c) Power-Pico d) Programmable on chip

3) Arduino shields are also called as _____.
   a) Extra peripherals b) Add on modules
   c) Connectivity modules d) Another Arduino

4) What is the default bootloader of the Arduino UNO?
   a) Opti-boot bootloader b) AIR-boot
   c) Bare box d) GAG

5) What are the pipelining stages include?
   a) Fetch, Decode, Write b) Fetch, Decode, Execute
   c) Fetch, Execute, Write d) Fetch, Decode, Execute, Write

6) What is pipe-lining?
   a) Non-linear b) Linear
   c) Linear and Non-linear d) Sometimes both

7) In AVR, which registers are there for the I/O programming of ports?
   a) PORT b) PIN
   c) DDR d) All of the mentioned

8) The data will not go from the port registers to the pin unless _____.
   a) DDR register of that port is set to 0
   b) PORT register of that port is set to 1
   c) DDR register of that port is set to 1
   d) PORT register of that port is set to 0

9) On reset DDR registers of all ports are set to _____.
   a) 0 b) 1
   c) None of the mentioned d) 0 & 1

10) Which of the following statements are correct?
   a) PIN register of a port is used to bring data into CPU from pins
   b) PORT register is used to send data out to pins
   c) DDR register is used to control the direction of a port
   d) All of the mentioned

11) Using what the processor wake-up from power-down?
   a) External Interrupts b) Internal interrupts
   c) Serial Programming d) Program Counter

12) What are the categories in the vectored interrupt controller?
   a) Fast interrupt request b) Non vectored interrupt request
   c) Non-vectored IQR d) all of these

13) The AVR Enhanced _____ microcontroller supports powerful and efficient addressing.
   a) RISC b) CISC
   c) VLIW d) none of these

14) Which of the following is not a member of status bits of AVR status register?
   a) AC b) C
   c) H d) T

Q.2 A) Answer the following questions. (Any Four) **08**

1) Draw the status register of AVR.
2) Discuss the special features of AVR instruction set model.
3) What is Arduino?
4) Distinguish between RISC and CISC.
5) What is an importance of Vector tables in microcontrollers?

B) Answer the following questions. (Any Two) **06**

1) Explain the general purpose and I/O registers of AVR MCU.
2) Explain the intrrupt handling in AVR.
3) Discuss in brief about ARM nomenclature.

Q.3 A) Answer the following questions. (Any Two) **08**

1) Write s library progrm(Arduino) for Analog_In_Serial_Out.
2) Explain memory mapping & pipelining of ARM7 core.
3) Discuss different type of direct addressing mode of AVR MCU.

B) Answer the following questions. (Any One) **06**

1) Interface 16x2 LCD to Arduino-UNO-R3 an display “Hello” on it.
2) Interface DHT 11 digital sensor with Arduino and monitor sensor values on serial monitor.

Q.4 A) Answer the following questions. (Any Two) **10**

1) Describe the different functional blocks of AVR architecture.
2) Explain the instruction categories of AVR family.
3) Explain in detail about interrupt and exception handling in ARM.

B) Answer the following questions. (Any One) **04**

1) What is the need and significance of AD595 in temperature monitoring?
2) What is SPI (AVR)?

Q.5 Answer the following questions. (Any Two) **14**

a) Design Arduino based system with LM35, 16x2 LCD for continuous temperature monitoring.
b) Explain various RESETs and discuss role of watchdog timer.
c) Design GSM based wireless communication (call/sms) system with Arduino board.

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Seat No.	

Set P

M.Sc. (Semester - IV) (CBCS) Examination Oct/Nov-2019
Electronics Science
SATELLITE COMMUNICATION

Day & Date: Monday, 11-11-2019 Max. Marks: 70
Time: 03:00 PM To 05:30 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.

Q.1 Fill in the blanks by choosing correct alternatives. **14**

1) The direction pointing towards the satellite from the centre of the orbit is _____.
   a) Nadir b) Zenith
   c) Azimuth d) Latitude

2) What will be noise temperature of amplifier? If the Noise Figure is 2.5dB.
   a) 290^0K b) 226^0K
   c) 500 ^{0}K d) 100^0K

3) An elevation angle is 90^0, if _____.
   a) azimuth angle is zero
   b) an earth station and sub-satellite point are at the same location
   c) an azimuth angle is 360^0-α
   d) the earth station is in southern hemisphere and satellite is NW of an earth station

4) Square of an orbital period is directly proportional to _____.
   a) the distance between surface of the earth and a satellite
   b) the square of distance between centre of the earth and a satellite
   c) eccentricity of an orbit
   d) the cube of an orbital radius

5) GPS satellites are launched in _____ orbit.
   a) LEO b) MEO
   c) GEO d) NGSO

6) Orbital velocity of MEO satellite system is _____, if the orbital height of the system is 10,255km.
   a) 3.0747 km/s b) 4.8954 km/s
   c) 7.1272 km/s d) 7.4624 km/s

7) Eccentricity of ellipse is _____.
   a) Zero b) One
   c) between zero and one d) ∞

8) In the US, home satellite TV system is developed with _____ antennas.
   a) 3 m dish b) 8 m dish
   c) 3.6 m dish d) both a and c

9) The frequency band of DBS TV in ITU Region-2 is _____.
   a) 12.2 -12.7 GHz b) 10.7 - 12.75 GHz
   c) 9.5 -10 GHz d) 4 – 6 GHz

10) A VSAT earth station receiver system uses _____ type antenna.
   a) Cassegrain b) gregorian
   c) both a and b d) patch

11) Up and down link delay is typically _____ for LEO.
   a) 119.3 ms b) 10.8 ms
   c) 5.4 ms d) 3.4 ms

12) The launching of _____ orbit satellite is complicated than other orbits.
   a) LEO b) MEO
   c) GEO d) NOT

13) Which of the following is active element in the antenna?
   a) feed antenna b) reflector antenna
   c) Driven d) all of the above

14) C/A code of GPS transmission is _____.
   a) cassegrain code b) carrier code
   c) coarse acquisition code d) none of above

Q.2 A) Answer the following (Any Four) **08**

1) Explain the small earth station.
2) Define orbit determination.
3) Draw and explain the principle of N-S control spinner satellite.
4) Discuss store-and-forward concept of elliptical orbits.
5) List out the Specification of SDRAS.

B) Write Notes on (Any Two) **06**

1) Explain Apogee and Perigee points of orbit
2) Define sun transit outage
3) Draw and explain redundancy of elements

Q.3 A) Answer the following (Any Two) **08**

1) Explain the teledesic constellation.
2) Give the brief explanation on launch vehicles.
3) What is an inclination change? Give brief explanation on effects of the sun and moon on orbit.

B) Answer the following (Any One) **06**

1) Explain elevation and azimuth angles of the satellite with suitable sketch.
2) What is reliability? Derive an expression for reliability.

Q.4 A) Answer the following (Any Two) **10**

1) Derive an expression for system noise temperature of the link.
2) Give the brief explanation of designing of specified C/N ratio.
3) Explain antenna sub-system of satellite.

B) Answer the following (Any One) **04**

1) Explain Molniya orbit.
2) Orbital period of satellite is once per sidereal day of 23h 56min 4.09s. Calculate the orbital radius of a satellite, $(\mu = 3.9860044 \times 105 km^3/s^2)$.

Q.5 Answer the following (Any Two) **14**

a) Explain telemetry and monitoring system of a satellite.
b) Explain the three segments of GPS.
c) Explain orbital perturbations. Explain reasons of orbital perturbations?