Seat No.

M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov - 2022
(ELECTRONICS)
Numerical Method

Day & Date: Monday, 13-02-2023   Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question 1 and 2 are compulsory.
               2) Attempt any Three from Q.3 to Q.7
               3) Figures to the right indicate full marks.

Q.1 **A)** **Choose Correct Alternative.**   **10**

1) Relative error (e_r) =_____.
   a) Absolute error/true value
   b) Actual value – approximate value
   c) (Absolute error/true value)×100
   d) None of the mentioned

2) The final corrector of the fourth-order Runge-Kutta method uses _____.
   a) Midpoint rule
   b) Backward Euler method
   c) Simpson's rule
   d) Trapezoidal rule

3) _____ is the example of the Iterative methods.
   a) Gauss seidel
   b) Gauss elimination
   c) Gauss Jordan
   d) All of the mentioned

4) The $L(e^{at} -1/a)$ is _____.
   a) $1/s(s+a)$
   b) $1/s(s-a)$
   c) $1/(s-a)$
   d) $1/(s+a)$

5) $\nabla f(X) = f(x + h) - f(x)$ is for _____.
   a) Forward differences
   b) Backward differences
   c) Divided differences
   d) Central differences

6) In the Taylor series remainder term includes all the terms from _____ to _____.
   a) 0 to n
   b) n to ∞
   c) 0 to $n + 1$
   d) $n + 1$ to ∞

7) _____ interpolation technique is a use finite difference.
   a) Newtons forward differences interpolation method
   b) Newton backward differences interpolation method
   c) Stirling's interpolation method based on central differences
   d) All of the mentioned

8) If $s^3 f(s) - s^2 F(0) - sF'(0) - F'(0) =$ _____.
   a) $L\{F''(t)\}$
   b) $L\{F'(t)\}$
   c) $L\{F''f(s)\}$
   d) None of the mentioned

9) Energy per unit charge is _____.
   a) Power
   b) Voltage
   c) Current
   d) Capacitance

10) The modified procedure of complete pivoting is called as _____.
   a) Additional
   b) Partial
   c) Reduced
   d) Modified

B) **State true/false.** 06
1) Direct methods are preferred over iterative methods as they provide solution faster.
2) For every tree there will be two number of cut set matrices.
3) Simpson's 3/8 rule is Approximates f(x) by a 3rd order polynomial.
4) LU Decomposition method is also known as triangularization method.
5) If A and B are two square matrices, then $|A.B|$ is same as $|B|.|A|$
6) The Elimination process in Gauss Elimination method is also known as Forward Elimination.

Q.2 **Answer the following.** 16
1) Find the inverse Laplace transform of $f(s) = \frac{s+2}{s2-2s+5}$
2) Write a note Triangularization method.
3) Evaluate $I = \int_1^{1.5} \frac{x}{y} dx$ using Simpson's 3/8 rule
4) What is error? Explain truncation error and rounding error.

Q.3 a) Obtain empirical relation by using Newton's forward and backward method of interpolation for fallowing set of points. 08

x	0	1	2	3
y	-1	1	1	-2

b) Derive the expressions for least square fitting method by straight line. 08

Q.4 a) Fit a curve of the form $= \frac{x}{ax+b}$ for the data given below by the method of least squares. 10

x	2	4	6	8	10
y	8.8	13.7	17.0	18.9	20.4

b) State and prove that Final value theorem. 06

Q.5 a) Solve the system of equations using Gauss elimination method 08
$2x_1 + x_2 + x_3 = 10$
$3x_1 + 2x_2 + 3x_3 = 18$
$x_1 + 4x_2 + 9x_3 = 16$

b) Write a note on Partial fractions. Solve $f(s) = \frac{1}{s2-9}$ 08

Q.6 a) Find the equation of the cubic curve that passes through the points (-1, -8), (0,3), (2,1) and (3,2) using Lagrange's interpolation formula. 08
b) Find the Laplace transform of RC circuit in numerical analysis also find charge store in the capacitor. 08

Q.7 a) State and prove property of periodic function. 10
If $F(t) = t^2, 0 < t < 2$ and $F(t+2) = F(t),$ find $L\{t\}$
b) What is truncation error in series approximation? 06

Seat No.

M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS)
Instrumentation Design

Day & Date: Tuesday, 14-02-2023   Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
            2) Attempt any Three questions from Q.3 to Q.7
            3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative.   **10**

1) A set of criteria that provide meaningful description of measurements under _____ conditions are called as static characteristics.
   a) Dynamic   b) Static
   c) Working   d) Environmental

2) For AC as well as DC signal conditioning _____ IC is used.
   a) IC 2B35   b) IC 2B30
   c) IC 2B20   d) IC 2B31

3) Gauge factor may be defined as the ratio of change in _____ with respect to the change in the length.
   a) Length   b) Distance
   c) Resistance   d) None of these

4) The branch of engineering which deals with various types of instruments to record, monitor, indicate and control various physical parameter such as pressure, temperature is called as _____ system.
   a) Communication   b) Instrumentation
   c) Both a and b   d) Digital

5) A _____ is an instrument which gives a graphic record of the relationship between two variables.
   a) X-Y recorder   b) X-T recorder
   c) Both a and b   d) None of the mentioned

6) Data logger displays the data in the form of _____.
   a) Analog   b) Digital
   c) Both a and b   d) None of the mentioned

7) In NLC type of Liquid Crystal Display molecules are _____ align.
   a) Orderly   b) Randomly
   c) Both a and b   d) None of the mentioned

8) What are the features of instrumentation amplifier?
   a) Low noise   b) Low thermal and time drift
   c) High gain accuracy   d) All of the mentioned

9) In S-type thermocouple _____ materials are used.
   a) Chromel /Alumel   b) Platinum-Platinum/Rhodium
   c) Iron/ Constantan   d) None of the mentioned

10) In case of 4 to 20mA current transmission the full scale current span is _____.
a) 0 to 20mA
b) 20mA
c) 16mA
d) 24mA

B) State True/False. 06
1) For the single channel DAS the IC - 0808 ADC is used because it has only one analog channel.
2) Thermocouple is connected in series and parallel connection is called as thermopiles.
3) The noise caused due to EM waves is called as EM noise.
4) The LVDT is based on principle of magnetic induction.
5) For the sensitive and accurate measurements offsetting and linearizing is necessary.
6) The AD524 is input for both power-on and power-off fault conditions.

Q.2 Answer the following. 16
a) What is plotter? Explain in details plotter.
b) Write a note on Hall Effect.
c) Write a note on AD590 temperature sensor.
d) What is a recorder? Explain strip chart recorder.

Q.3 a) Explain construction and working principle of LVDT. 08
b) What is instrumentation system? Design instrumentation system for measurement of humidity. 08

Q.4 a) Explain in detail Strain gauge and derive the expression for gauge factor. 10
b) Write a note on data loggers. 06

Q.5 a) Explain construction and working principle of thermocouple. 08
b) What are the actuators? explain electromagnetic relay and IR proximity sensor in detail. 08

Q.6 a) Explain the interfacing circuit for PT100 and AD590 to microcontroller. 08
b) Explain general block diagram of instrument design for measurement. And write a note on Grounding, Shielding and Excitation. 08

Q.7 a) Explain in details temperature transducer. 10
b) Write a note on IR proximity sensor. 06

Seat No.

M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022 (ELECTRONICS)
Power Electronics

Day & Date: Wednesday, 15-02-2023   Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question 1 and 2 are compulsory.
                2) Attempt any Three from Q.3 to Q.7
                3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative.   **10**

1) Class E choppers has _____ quadrant operation.
   a) Two   b) One
   c) Three   d) Four

2) Practically, the nature of the output of single phase bridge inverter is _____.
   a) Square wave   b) Sine wave
   c) triangular wave   d) sawtooth wave

3) In PWM technique the output voltage is controlled by changing _____.
   a) firing angle   b) width of pulses
   c) Extinction angle   d) Amplitude of I/P

4) Using the single pulse modulation _____ of the output of the inverter can be reduced.
   a) Ac voltage   b) Magnitude
   c) Harmonic content   d) p-p voltage

5) _____ provide variable output voltage with fixed frequency.
   a) AC voltage controllers   b) Inverter
   c) Chopper   d) Cycloconverter

6) Sinusoidal PWM has M.I. varying between _____.
   a) 0 to 10   b) 0 to 100
   c) 0 to 1   d) 0 to 0.1

7) _____ symbolizes the Extinction angle of the thyristor.
   a) ϕ b) β
   c) α d) δ

8) The output of the cycloconverter is controlled by _____ angle of the thyristors.
   a) Delay   b) Extinction
   c) Conduction   d) All of these

9) Thyristor delivers maximum power to the load with _____.
   a) $\alpha = 0$ b) $\alpha = \pi$
   c) $\alpha = \pi/2$ d) $\alpha = \pi/4$

10) Mc- Murray Bedford uses _____ commutation.
   a) Current   b) Voltage
   c) Either voltage or current   d) Neither voltage nor current

B) **State True/False.** 06
1) Dual converter exhibits two quadrant operation.
2) Rectifier can be used for driving DC motors.
3) Class C chopper exhibits one quadrant operation.
4) Cycloconverter uses intergroup reactor to prevent failure.
5) Bidirectional ac voltage controller uses the principle of phase control.
6) Asymmetrical configuration of single phase semiconverter uses thyristor for freewheeling mode.

Q.2 **Answer the following.** 16
1) Draw a neat labeled circuit diagram of mid point cycloconverter.
2) Define choppers. Describe its classification.
3) Draw a neat labeled circuit diagram of Mc Murray half bridge inverter.
4) Explain SAC technique for power factor improvement.

Q.3 **a)** Explain operation of three phase half wave controller with resistive load for delay angle of less than $\pi/2$ 08
b) Explain the operation of single phase dual converter. 08

Q.4 **a)** Explain the working of single phase half controlled bridge rectifier with R-L load. 08
b) Explain the working of single phase step up cycloconverter. 08

Q.5 **a)** Describe the operation of single phase half bridge inverter in detail. 10
b) Explain the working of Current Source inverter. 06

Q.6 **a)** Discuss any two chopper control techniques. 08
b) Describe the principle of phase control in AC voltage controllers. 08

Q.7 **a)** Explain the working of single phase unidirectional controller with R-L load. 08
b) Explain three phase half wave (unidirectional) ac voltage controller. 08

Seat No.	

M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS)
Advanced Microcontrollers

Day & Date: Thursday, 16-02-2023   Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question 1and 2 are compulsory.
　　　　　　　2) Attempt any Three from Q.3 to Q.7
　　　　　　　3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative.   **10**

1) Abbreviate CISC and RISC.
   a) Complete Instruction Set Computer, Reduced Instruction Set Computer
   b) Complex Instruction Set Computer, Reduced Instruction Set Computer
   c) Complex Instruction Set Computer, Reliable Instruction Set Computer
   d) Complete Instruction Set Computer, Reliable Instruction Set Computer

2) Which bit is mandatory to get initiated or set for executing the process of analog to digital conversion in ADCON0?
   a) ADIF   b) ADON
   c) Go/!Done   d) ADSCI

3) The _____ is the data direction register.
   a) DDRx   b) PORTx
   c) PINx   d) PINA

4) Which of the following are header files?
   a) #include   b) file
   c) struct()   d) proc()

5) Which command enables the PIC to enter into the power down mode during the operation of watchdog timer (WDT)?
   a) SLEEP   b) RESET
   c) STATUS   d) CLR

6) In AVR _____, _____ are used as Z-pointer Registers
   a) R26, R27   b) R28, R29
   c) R30, R31   d) R0, R1

7) ADLAR bit of ADMUX register is high to _____ the result
   a) left adjust   b) right adjust
   c) fix 8 bit   d) both b and c

8) The ATmega8 features a _____ successive approximation ADC.
   a) 8- bit   b) 10-bit
   c) 16-bit   d) 32-bit

9) Which of the following has a Harvard architecture?
   a) EDSAC   b) SSEM
   c) PIC   d) CSIRAC

10) 16F877 support _____ interrupt source.
    a) 15   b) 32
    c) 14   d) 16

B) **State true/false.** 06
1) The Program Counter (PC) of PIC is 13 bits wide.
2) GIE stands for Global Input Enable bit.
3) The ATmega8 contains 8Kbytes On-chip In-System Reprogrammable Flash memory for program storage.
4) The ATmega8 have 30 x 8 General Purpose Working Registers.
5) EECON1 is the control register for memory accesses.
6) The USART Transmitter is enabled by setting the Transmit Enable (TXEN) bit in the USARB Register.

Q.2 **Answer the following.** 16
a) Draw Reset, and clock circuits of 16F877.
b) Write program to blink LED connected at port B.
c) Explain the need of Instruction set for Microcontroller.
d) Write note on Ports of AVR Microcontroller.

Q.3 **a)** Explain the Architecture of PIC 16F877. 08
b) Write note on branch control instructions of AVR with syntax. 08

Q.4 **a)** Explain the working of on chip ADC of AVR. 10
b) Explain Timers of PIC Microcontroller in details. 06

Q.5 **a)** Explain Addressing modes of AVR Microcontroller. 08
b) Write note on watchdog timer of PIC Microcontroller. 08

Q.6 **a)** Explain temperature measurement system using PIC Microcontroller with suitable diagram. 10
b) Write any six salient features of AVR. 06

Q.7 **a)** Explain LCD interfacing to AVR Microcontroller with suitable diagram. 10
b) Write note on Micro C the IDE for embedded C programming. 06

Seat
No.

M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS)
Control Theory

Day & Date: Monday, 20-02-2023   Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to 7.
3) Figures to the right indicate full marks.

Q.1 **A)** **Choose the correct alternative from the options.**   **10**
1) _____ is a disadvantage of open loop system.
   a) Simple construction   b) Easy for maintenance
   c) Simple Design   d) Unreliability

2) In SFG, the node having only outgoing branches is called _____.
   a) source node   b) sink node
   c) chain node   d) forward node

3) A closed loop system is distinguished from open loop system by _____.
   a) Input pattern   b) Servomechanism
   c) Feedback   d) Output pattern

4) A ramp function has value of zero for t_____.
   a) < 0 b) $= 0$
   c) ≤ 0 d) $= 1$

5) Input signal to control system is also called as_____ signal.
   a) feed   b) excitation
   c) control   d) forward

6) The type 0 system has_____ at the origin.
   a) zero pole   b) two poles
   c) infinite poles   d) single pole

7) For a positive feedback signal, error signal is represented by e(t)= _____.
   a) b(t) / r(t)   b) b(t) - r(t)
   c) b(t) + r(t)   d) r(t) - b(t)

8) A Feedback control system is basically ___.
   a) High pass filter   b) low pass filter
   c) band pass filter   d) all pass filter

9) A control system is linear if it satisfies____ property.
   a) additive   b) homogeneous
   c) additive and homogeneous   d) time variance

10) ___ is the best method for determining the stability and transient response.
   a) Bode plot   b) Nyquist plot
   c) Mason's formula   d) time variance

B) **Write true/false.** 06
   1) An electric switch is an example of closed loop system.
   2) The graph of log magnitude against frequency is called Bode Plot.
   3) The system with T.F. G(s)H(s) = 1/(s(s+5)) is a second order system.
   4) According to Routh- Hurwitz criteria if the roots of the characteristic equation lie on the right half of the 'S' plane for the system to be stable.
   5) $f(x)=x^3$ is a linear system.
   6) A step function has value of zero for t<0.

Q.2 Answer the following. 16
   a) Compare the open loop and closed loop system.
   b) Write a note on Proportional control mode.
   c) Define the term Transfer Function. Mention its features.
   d) Define source node, sink node, chain node and forward path of SFG.
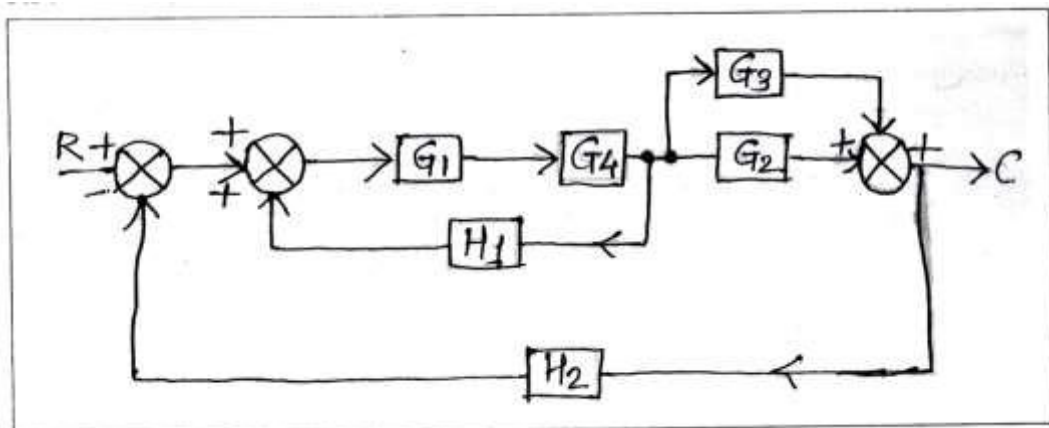
Q.3 Answer the following.
   a) Describe the bode plot for a control system. 10
   b) Derive an expression for steady state error for step and ramp input. 06

Q.4 Answer the following.
   a) Describe the effect of damping factor ε on the transient response of the second order system. 10
   b) Discuss the term stability of the system. 06

Q.5 Answer the following.
   a) Examine the stability of control system having characteristic equation $S^3+6S^2+11S+6 = 0$ by Routh's Criterion. Give the advantages and limitations of the criterion. 08
   b) Using standard rules reduce following block diagram to single block and determine its T.F. 08

Q.6 Answer the following.
   a) Describe the PD controller. 08
   b) Write a note on Hurwitz Criterion on the stability. 08

Q.7 Answer the following.
   a) What is need of block diagram reduction? Explain in detail the rules used for block diagram reduction. 10
   b) With suitable example describe the Root Locus of any control system. 06

Seat No.	

M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov - 2022
(ELECTRONICS)
Real Time Operating System

Day & Date: Tuesday, 21-02-2023   Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. No. 1 & 2 are compulsory.
      2) Attempt any three questions from Q. No. 3 to 7
      3) Figures to the right indicate full marks.

Q.1 A)   **Choose Correct Alternative.**   **10**

1) For real time operating systems, interrupt latency should be _____.
  a) minimal
  b) maximum
  c) zero
  d) dependent on the scheduling

2) Which one of the following is a real time operating system?
  a) RTLinux
  b) VxWorks
  c) Windows CE
  d) All of the mentioned

3) What is the disadvantage of real addressing mode?
  a) There is a lot of cost involved
  b) Time consumption overhead
  c) Absence of memory protection between processes
  d) Restricted access to memory locations by processes

4) Preemptive, priority based scheduling guarantees _____.
  a) hard real time functionality
  b) soft real time functionality
  c) protection of memory
  d) none of the mentioned

5) To schedule the processes, they are considered _____.
  a) infinitely long   b) periodic
  c) heavy weight   d) light weight

6) What is the core of Linux operating system?
  a) command   b) terminal
  c) kernel   d) shell

7) What happens to the interrupts in an interrupt service routine?
  a) disable interrupt   b) enable interrupts
  c) remains unchanged   d) ready state

8) Semaphore is a/an _____ to solve the critical section problem.
  a) hardware for a system
  b) special program for a system
  c) integer variable
  d) none of the mentioned

9) What are Spinlocks?
    a) CPU cycles wasting locks over critical sections of programs
    b) Locks that avoid time wastage in context switches
    c) Locks that work better on multiprocessor systems
    d) All of the mentioned

10) The _____ Operating System pays more attention to the meeting of the time limits.
    a) Network   b) Distributed
    c) Online   d) Real-time

B) State True / False. 06
    1) Hard real time operating system has less jitter than a soft real time operating system.
    2) Priority inversion is solved by use of Time protocol.
    3) AVR ATmega8L microcontroller has two 8-bit Timer.
    4) LM35 sensor is used to measure temperature and humidity.
    5) In a hard real time system, it is guaranteed that critical real time tasks will be completed within their deadlines
    6) Pthreads refers to the POSIX standard defining an API for thread creation and Synchronization.

Q.2 Answer the following. 16
    a) Draw minimum required embedded system base on AVR.
    b) Compare Hard and Soft Real Time Systems.
    c) Write characteristics of embedded system.
    d) Write note on Binary semaphore.

Q.3 a) Define types of task.   08
     b) Write note on mutex.   08

Q.4 a) Explain in detail deadlocks, spinlocks.   10
     b) Explain concept of Sharing of resources.   06

Q.5 a) Explain in detail Services of Scheduler.   08
     b) Write note on priority based preemptive scheduling.   08

Q.6 a) Explain in detail MicroC/OS-II kernel.   10
     b) Write note on Intertask Communication.   06

Q.7 a) Design embedded systems for Measurement of wind velocity.   10
     b) Write note on Mailboxes.   06

Seat No.	

M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov - 2022
(ELECTRONICS)
Opto Electronics

Day & Date: Wednesday, 22-02-2023   Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q.1 and Q.2 are compulsory.
        2) Figures to the right indicate full marks.
        3) Attempt any three questions from Q. No. 3 to 7.

Q.1 A) Chose the correct answer: **10**

1) A graded index profile in optical fiber cable provides _____.
   a) Less waveguide dispersion than SI profile
   b) Less material dispersion than SI profile
   c) Less attenuation in SI profile
   d) Less model dispersion than SI profile.

2) The general condition for a phototransistor is _____.
   a) Common base configuration
   b) Common collector configuration
   c) Common emitter configuration
   d) Darlington-pair configuration

3) Loss in fiber is due to _____.
   a) Impurities   b) Microbending
   c) attenuation in fiber   d) All of these

4) The relation between bandwidth of an optical fiber and NA is ____.
   a) $BW \propto NW$ b) $BW \propto 1/NA$
   c) $BW \propto 1/(NA)^2$ d) $BW \propto 1/(NA)^3$

5) Photo detectors convert_____.
   a) optical power into electrical voltage
   b) optical power into electrical current
   c) electrical current into optical power
   d) None of these

6) Dispersion in silica fibers is minimum at $\lambda=$ ____.
   a) 850 nm   b) 1300 nm
   c) 1550 nm   d) 750 nm

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

8) Attenuation in optical fiber can be measured in _____.
   a) dB/km   b) dB/m
   c) kdB/m   d) dBm/m

9) A laser diode _____.
   a) Produces always light of single wavelength
   b) Produces always light of multiple wavelength
   c) Can be made to produce light of single and multiple wavelengths
   d) Produces visible light spectrum

10) ＿＿＿ having the highest refractive index.
    a) diamond   b) air
    c) water   d) glass

B) State True or False.   **06**
    1) The numeric aperture is the fiber optic cable's ability to diffract the light.
    2) The transmission frequency in optical fiber 10^{11}Hz.
    3) He-Ne laser is a type of gas laser.
    4) Reverse biased, PIN diode acts as constant capacitor.
    5) In the first window of optical fiber, light source are generally GeA1As.
    6) Graded index can be used for multimode fiber optic communication.

Q.2 Answer the following.   **16**
    a) State the different disadvantages of optical fiber communication.
    b) What are the major causes of losses in Laser?
    c) Explain kerr effect.
    d) Write note on Pulse spread due to material dispersion.

Q.3 Answer the following.
    a) With neat diagram explain propagation of light in optical fiber.   **10**
    b) Draw block diagram of optical fiber communication system and explain.   **06**

Q.4 Answer the following.
    a) Describe briefly APD photodiode.   **08**
    b) Explain the structure of surface emitter LEDs using neat schematics.   **08**

Q.5 Answer the following.
    a) Explain the construction and principle of operation of He-Ne laser.   **10**
    b) Explain the various loss that takes place in optical fiber. Draw suitable diagrams to explain your answer.   **06**

Q.6 Answer the following.
    a) Explain terms: **08**
        i) optical anostropy
        ii) Birefringence Calsite
        iii) Dichroism
    b) What is modulation? Discuss intensity modulation with special reference to fiber optic instrumentation.   **08**

Q.7 Answer the following.
    a) Discuss the various loss that takes place in optical fiber. Draw suitable diagrams to justify your explanation.   **10**
    b) Discuss the working principle of PIN photo detector with physical structure, field distribution and energy diagram.   **06**

Seat No.	

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS)
Digital Signal Processing

Day & Date: Monday, 13-02-2023   Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Question 1 and 2 are compulsory.
               2) Attempt any Three from Q.3 to Q.7
               3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative.   **10**

1) _____ Signals are used to check the performance of a system.
   a) Delta function   b) Unit ramp signal
   c) Exponential signal   d) All of the mentioned

2) The ROC of z-transform of finite duration anti-causal sequence is _____.
   a) $z = 0$ b) $z = \infty$
   c) Entire z-plane, except at $z = 0$ d) Entire z-plane, except at $z = \infty$

3) The width of the main lobe of the frequency response of a rectangular window of length M-1 is _____.
   a) π/M b) $2\pi/M$
   c) $4\pi/M$ d) $8\pi/M$

4) The total number of complex multiplications required computing N point DFT by radix-2 FFT is _____.
   a) $(N/2)\log_2 N$ b) $N\log_2 N$
   c) $(N/2)\log N$ d) None of the mentioned

5) The sampling frequency of a signal is F_2 = 2000 samples per second then its Nyquist interval is _____.
   a) 0.5 sec   b) 5 msec
   c) 5 sec   d) 0.5 msec

6) The ROC of the z-transform of a unite step function is _____.
   a) $|z| > 1$ b) $|z| < 1$
   c) $(\text{real part of } z) > 0$ d) $(\text{real part of } z) < 0$

7) _____ is the example of one-dimensional signal.
   a) ac power supply signal   b) speech signal
   c) variation of room temperature   d) All of the mentioned

8) The Fourier transform of a function x(t) is X(f). The Fourier transform of dx(t)/dt will be _____.
   a) dX(f)/df   b) jfX(f)
   c) j2∏fX(f)   d) X(f)/jf

9) $x(n) = \{2,4,\overset{\uparrow}{5},7,1\}$ then the ZT of the given finite duration signal is _____.

   a) $2 + 4z + 5z^2 + 7z^3 + z^4$ b) $2 + 4z + 5z^2 + 7z^3 + z^5$
   c) $2 + 4z^{-1} + 5z^{-2} + 7z^{-3} + z^{-5}$ d) $2z^2 + 4z + 5 + 7z^{-1} + z^{-3}$

10) If X(k) is the N/2 point DFT of the sequence x(n), then the value of X(k+N/2) is _____.
   a) $F_1(k) + F_2(k)$
   b) $F_1(k) - W_N^{Nk} F_2(k)$
   c) $F_1(k) + W_N^{Nk} F_2(k)$
   d) None of the mentioned

B) **State true/false.**   06
   1) If x(n) is real then $X^*(\omega) = X(-\omega)$
   2) The anti-symmetric condition with M even is not used in the design of high pass linear-phase FIR filter.
   3) Continuous time non-periodic signal have aperiodic continuous spectra.
   4) The one sided z-transform of $x(n) = \delta(n - k)$ is z^{-k}
   5) The multiplication of two DFTs is equivalent to the circular convolution of their sequences in time domain.
   6) The FT of real valued time signal has no symmetry.

Q.2 Answer the following.   16
   1) Define Fourier transform. Explain the condition required for existence of FT.
   2) What is DSP? What are the applications of DSP?
   3) Find the inverse Z of $X(Z) = Z/Z - a$ if $|z||<|a$ using long division method.
   4) Find the FT of the signal $x(t) = \cos(\omega_0 t)$

Q.3 a) Prove that stability criteria for LSI systems in terms of unit impulse response.   08

   b) Compute the eight point DFT of a sequence.   08
   $x(n) = \{1/2, 1/2, 1/2, 1/2, 0, 0, 0, 0\}$ using in place radix -2 decimation in time FFT algorithm.

Q.4 a) Determine direct form-II realization for each of the following LTI system   10
   i) $2y(n) + y(n - 1) - 4y(n - 3) = x(n) + 3x(n - 1)$
   ii) $y(n) = x(n) - x(n - 1) + 2x(n - 2) - 3x(n - 4)$
   b) Draw flow diagram of DITFFT for N=16   06

Q.5 a) Define and prove ZT of unit ramp function and comment on its ROC.   08

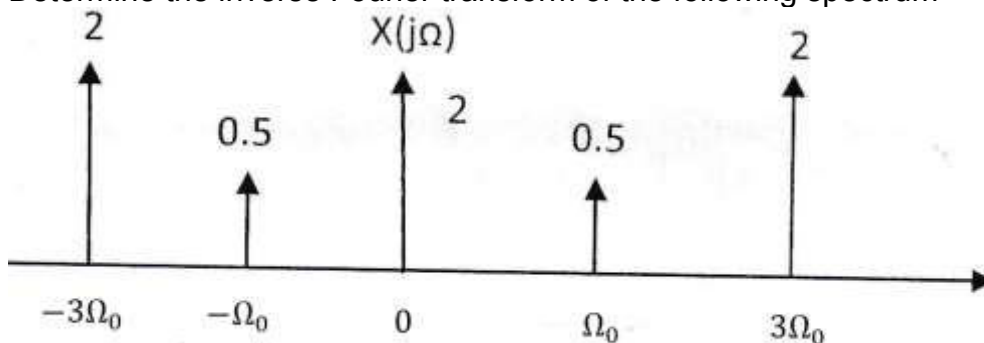   **b)** Prove that ideal filters are practically not realizable.   08

Q.6 a) Determine the inverse Fourier transform of the following spectrum   08

   b) What is twiddle factor? Derive properties of twiddle factor.   08

Q.7 a) Determine the Z-transform of $x(n) = (\cos\omega_0 n).u(n)$ 10
   b) Find the Fourier transform of complex and real functions.   06

Seat No.

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS)
Advanced Digital Design with VHDL

Day & Date: Tuesday, 14-02-2023   Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any Three questions from Q.3 to Q.7
3) Figures to the right indicate full marks.

Q.1   A)   Choose Correct Alternative.   **10**
1) The _____ are the programming technologies used for PLD.
   a) SRAM   b) EPROM
   c) Flash   d) All of these

2) The FPGA architecture are based on _____ to generate logic functions
   a) LUT   b) multiplexer
   c) microcell   d) Both a & b

3) The VHDL supports _____ design methodology.
   a) top-down   b) bottom-up
   c) mixed   d) All of these

4) The Generate statement is _____ statement.
   a) sequential   b) concurrent
   c) process   d) All of these

5) The _____ adding operator used in VHDL.
   a) '+'   b) '-'
   c) '&'   d) All of these

6) The meaning of 'H' is _____in Data Types STD_LOGIC_1164.
   a) high   b) 1
   c) weak 1   d) All of these

7) The GENERIC statement is declared in _____ of the VHDL code.
   a) architecture   b) entity
   c) process   d) All of these

8) The back end design is used to create _____ source of design.
   a) technology   b) physical
   c) logic   d) circuit

9) The exit and next statements are used _____ loop statement.
   a) outside   b) inside
   c) Both a & b   d) None of these

10) The mode of ports in entity declaration are _____ types.
   a) 2   b) 3
   c) 4   d) None of these

B) **State True/False.** 06

1) The WAIT statement provides an alternate way to suspend the execution of a process.
2) The place and route tool belongs to front end design process.
3) The component declaration is appeared in the declaration part of architecture.
4) The LOOP statement is used to iterate through the set of concurrent statement.
5) The generic and constant values are assigned by ':=' assignment operator.
6) The PROCESS statement is itself a concurrent statement.

Q.2 Answer the following. 16

a) State in brief the features of VHDL.
b) Explain the CPLD.
c) Write a note on Macrocell.
d) Explain the entity using controlled inverter.

Q.3 a) Discuss the basic language element of VHDL? Explain identifier and operators in detail. 10
b) Write the VHDL code for 8 to 1 multiplexer. 06

Q.4 a) Explain the various types of architecture bodies for VHDL with suitable example. 10
b) Write VHDL code for decade counter. 06

Q.5 a) Explain the PLD design flow for IC fabrication. Explain the EDA tools for PLD. 10
b) Write VHDL code for 8 to 3 encoder. 06

Q.6 a) Give the detail classification of PLD devices. Explain the FPGA in detail. 10
b) Write VHDL code for 4-bit gray to binary code. 06

Q.7 a) Explain the Attributes and Generic for VHDL. 10
b) Write VHDL code for ALU using concurrent statement. 06

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS)
ARM Microcontroller and system design

Day & Date: Wednesday, 15-02-2023   Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Question 1 and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7
3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative.   10

1) _____ is the standard form of ARM.
a) Advanced RISC Machine   b) Automatic RISC Machine
c) Automatic RISC Motor   d) None of the mentioned

2) LPC 2148 pro development board has _____ on chip memory.
a) 500k   b) 625k
c) 512k   d) 425k

3) The ARM has _____ registers.
a) Eight   b) Thirty-seven
c) Four   d) Sixteen

4) ARM is used in Mobile because _____.
a) ARM required less power   b) ARM required more power
c) ARM required Medium power   d) None of the mentioned

5) ARM microcontroller does _____ arithmetic shift operators.
a) One   b) Two
c) Three   d) Four

6) In LPC 2148 _____ is the functions of Mask register.
a) Byte addressability
b) Relocation to ARM local bus for fastest possible I/O timing
c) Treating sets of port bits in the form of group without changing other bits
d) All of the mentioned

7) Most of the processor designed by ARM are _____.
a) 16bit   b) 8bit
c) 32bit   d) 64bit

8) _____ are the hardware stacks in ARM7 and ARM9.
a) FIQ, IRQ   b) SVC, USR
c) ABT, UND   d) All of the mentioned

9) USB 2.0 full speed compliant device controller with _____ of end point RAM.
a) 6 kB   b) 4 kB
c) 2 kB   d) 8 kB

10) The LPC2148 board is supports _____ IDE.
a) Code Blocks   b) AVR Studio 4
c) Keil uVersion 4   d) Walldorf

    B)   **State true/false.**   **06**

1) RN instruction is used to list the registers used for execution.
2) In LPC 2148 we require separate programmer.
3) ARM7 has an in-built debugging device.
4) The design rules allow RISC to be simpler.
5) ARM7TDMI controller is 64bit.
6) On the board timers has 4 compare and 4 capture channels.

Q.2 **Answer the following.** **16**
1) Compare between ARM, Thumb and Jazelle ISA.
2) Write a note on CPSR.
3) Explain the software interrupt instruction.
4) Write a note on barrel shifter.

Q.3 **a)** Draw the block diagram of ARM processor core and explain each block in detail. **10**
    b) Explain the Pin out structure of LPC2148. **06**

Q.4 **a)** Explain the Thumb instruction set architecture. **10**
    b) Explain the bus technology and describe the AMBA bus architecture of ARM processor. **06**

Q.5 **a)** Draw and explain the structure of saved program status register in ARM processor. **08**
    b) What is Data Transfer and Explain the Data Transfer Instructions of ARM processor. **08**

Q.6 **a)** Explain interrupt and exception of ARM processor. **08**
    b) What is pipelining? Explain the concept of pipelining in ARM processor. **08**

Q.7 **a)** What is TDML of ARM microcontroller? Explain the term ARM7TDMI. **10**
    b) Write a note on interrupts of ARM and Explain the feature of ADC of LPC2148. **06**

Seat No.		**Set**	**P**

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS)
CMOS Design Technologies

Day & Date: Wednesday, 15-02-2023   Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Q.1 and Q.2 are compulsory.
             2) Attempt any three question from Q.No.3 to Q.No.7
             3) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternative for the following.   **10**

1) Rise time is the time for a waveform to rise from _____ of its steady state value.
   a) 10% to 90%   b) 50% to 90%
   c) 10% to 20%   d) 0%to 10%

2) Silicon in its intrinsic state is a _____.
   a) conductor   b) semiconductor
   c) insulator   d) resistor

3) _____ method is used to reduce bird's beak effect.
   a) czochralski   b) LOCOS
   c) SWAMI   d) epitaxy

4) _____ power dissipation occurs due to charging and discharging of load current.
   a) Static   b) Total
   c) Short circuit   d) Dynamic

5) The SiO2 layer under the gate of MOS transistor acts as a _____.
   a) Dielectric   b) charge carrier
   c) Conductor   d) epi layer

6) The desired β_n/β_p ratio for CMOS inverter is _____.
   a) 2   b) 10
   c) 1/2   d) 1

7) The sheet resistance of dopped polysilicon is between _____ Ω/square.
   a) 5 to15   b) 20 to 40
   c) 10 to 20   d) 30 to 50

8) The current in a conducting channel of a MOS device is modulated by ___.
   a) Vdd   b) Vss
   c) Vgs   d) Vsb

9) In the fabrication of CMOS resistor the polysilicon is _____ dopped.
   a) not   b) moderately
   c) lightly   d) heavily

10) As the temperature of MOS device increases the mobility _____.
   a) increases   b) decreases
   c) remains constant   d) falls to zero

B) Write True/False. 06
1) Voltage transfer characteristics of CMOS inverter are independent of ratio $\beta n/\beta p$.
2) In PMS design environment P stands for Process.
3) Lambda rules are used to express physical dimensions of VLSI circuit.
4) Photoresist material cannot be used as a mask in CMOS fabrication process.
5) Latchup may result into circuit failure.
6) Dopped silicon is used as basic material for CMOS fabrication.

Q.2 Answer the following. 16
1) Derive threshold voltage equation.
2) Write a note on noise margin.
3) Draw the physical structure of nMOS and pMOS transistor.
4) Write a note on the structure of CMOS capacitor.

Q.3 Answer the following.
a) Describe the basic steps involved in MOS device fabrication. 10
b) Explain the static power dissipation in CMOS. 06

Q.4 Answer the following.
a) Explain n-well process of fabrication. 08
b) Explain the second order effects. 08

Q.5 Answer the following.
a) Explain the DC characteristics of CMOS inverter. 10
b) Draw the stick diagram for CMOS NAND gates. 06

Q.6 Answer the following.
a) Discuss the characteristics of digital Electronic Design. 08
b) Describe the process of routing in CAD. 08

Q.7 Answer the following.
a) Obtain the MOS device design equations. 10
b) Describe the operation of CMOS inverter. 06

Seat No.	

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS)
Microwave Devices, Antennas and Measurements

Day & Date: Monday, 20-02-2023   Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
             2) Attempt any Three questions from Q.No.3 to Q.No.7.
             3) Figures to the right indicate full marks.

Q.1   **A)**   **Choose correct alternative.**   **10**

1) For co-axial lines and waveguides, _____ is more preferred.
a) Open circuited stub
b) Short circuited stub
c) Slotted section
d) Co-axial lines cannot be impedance matched

2) The Gauss law employs _____ theorem for the calculation of charge Density?
a) Green theorem   b) Stokes theorem
c) Gauss theorem   d) Maxwell equation

3) Smith chart is based on the polar plot of _____.
a) Reactance   b) Voltage
c) Current   d) Voltage reflection co-efficient

4) _____ is a device that converts electrons to photons or vice-versa.
a) Antenna   b) Electron gun
c) Photon amplifier   d) Microwave tube

5) Attenuation of a propagating wave is due to _____.
a) Conductor loss
b) Di-electric loss
c) Sum of both conductor loss and di electric loss
d) Attenuation is different from the losses

6) Scattering matrix for a reciprocal network is _____.
a) Symmetric   b) Unitary
c) Skew symmetric   d) Identity matrix

7) _____ quantity is solenoidal in the electromagnetic theory.
a) Electric field intensity   b) Electric flux density
c) Magnetic field intensity   d) Magnetic flux density

8) A PIN diode consists of _____ number of semiconductor layers.
a) Three   b) Two
c) Four   d) One

9) The klystron tube used in a klystron amplifier is a _____ type beam amplifier.
a) Linear beam   b) Crossed field
c) Parallel field   d) None of the mentioned

10) When a load Z_L is matched to a line, the value of standing wave ratio is __.
    a)   0
    b)   1
    c)   Infinity
    d)   insufficient data to calculate SWR

B)   **State True/False.**   **06**
    1)   In a backward wave oscillator, the RF wave travels along the helix from the collector towards the electron gun.
    2)   Dominant mode is defined as mode with the highest cut off frequency.
    3)   IMPATT diodes employ impact ionization technique which is a noisy mechanism of generating charge carriers.
    4)   Power radiated from an antenna per unit solid angle is called radiation intensity.
    5)   The transmission line to be matched to the load, the condition to be satisfied is $Z_L \neq Z_0$.
    6)   The electrodes of a Gunn diode are made of molybdenum.

Q.2 **Answer the following.**   **16**
    1)   Write a note on Transmission coefficient.
    2)   Explain Circulators and Isolators.
    3)   Write a note on InP diode.
    4)   Explain Co-axial connector.

Q.3 **a)**   What are the Maxwell's equations? Explain with its boundary conditions.   **08**
    b)   Write a note on Cavity Resonator. Calculate Expression for f_0 in rectangular cavity resonator.   **08**

Q.4 **a)**   A transmission line has following parameters R= 2Ωm, G= 0.5 m℧/m, F= 1GHz, L= 8nH/m, C=0.23pF calculate.   **10**
    a)   Characteristics impedance
    b)   Propagation constant
    b)   Explain horn antenna and reflector antenna.   **06**

Q.5 **a)**   Write a note on Smith chart. Calculate the center and radius of the Rn circle.   **08**
    b)   Explain E-plane Tee in detail.   **08**

Q.6 **a)**   Explain Klystrons and Multicavity Klystron Amplifiers.   **08**
    b)   Explain hyperbolic function. Derive the expression for hyperbolic function.   **08**

Q.7 **a)**   What are the methods for impedance matching? Explain any one of them.   **10**
    b)   Explain IMPATT diodes.   **06**

Seat No.	

M.Sc. (Semester – IV) (New) (CBCS) Examination: Oct/Nov-2022 (ELECTRONICS)
Networking and data communications

Day & Date: Tuesday, 21-02-2023   Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question Nos.1 and 2 are compulsory.
                  2) Attempt any three questions from Q. No. 3 to Q. No. 7.
                  3) Figure to right indicate full marks.

Q.1   **A)**   **Choose correct alternative.**   **10**

1) Standard Ethernet provides data rate of _____.
   a) 10 Mbps   b) 100 Mbps
   c) 10 bps   d) 1Mbps

2) _____ Topology has dedicated point to point link to every other device in the network.
   a) Star   b) Ring
   c) Mesh   d) Bus

3) The address space of IPv4 is _____ address.
   a) 2^{128} b) 2^{64}
   c) 2^{16} d) 2^{32}

4) The Address field of a PPP frame is _____ for broadcast address.
   a) 10101010   b) 11111111
   c) 01010101   d) 01111110

5) Message _____ ensured that the message is coming from the intended sender.
   a) confidentiality   b) integrity
   c) authentication   d) none of the mentioned

6) _____ layer is responsible for process to process delivery of data packets.
   a) Physical   b) Network
   c) Presentation   d) Transport

7) OSI model has _____ layers.
   a) 7   b) 5
   c) 8   d) 3

8) In IEEE 802.11, a BSS without an AP is called as _____.
   a) Network   b) an ad hoc architecture
   c) either (a) or (b)   d) neither (a) nor (b)

9) A network formed with Bluetooth wireless technology is called as _____.
   a) Internet   b) Microne
   c) Nanonet   d) Piconet

10) _____ communication mode uses the entire capacity of the channel in both directions.
   a) simplex mode   b) half duplex mode
   c) both a and b   d) Full duplex mode

Q.1 B) State True/False. 06
1) A Bluetooth device has a built-in short range radio transmitter.
2) Cryptography is not used to authenticate the sender and receiver of message to each other.
3) Internetwork is made of five networks.
4) Data communication is require at least two devices working together, one to send and other to receive.
5) The address space for IPv6 has 2^{32} addresses.
6) UNIX is the protocol suite for the current Internet.

Q.2 Answer the following. 16
1) Describe virtual switched network.
2) Discuss the domain name system.
3) Explain Architecture of WWW.
4) Explain the massage authentication.

Q.3 a) Describe the TCP/IP model. 08
b) Explain data delivery and forwarding in detail. 08

Q.4 a) Explain role of cryptography in networking. 10
b) Explain PPP. 06

Q.5 a) Describe guided and unguided transmission media. 08
b) Write a note on SMTP and HTMP. 08

Q.6 a) Describe DNS in the internet. 08
b) Describe Bluetooth technology. 08

Q.7 a) What is Data Communication and Explain the Network topology of network. 10
b) Explain ATM technology. 06

Seat No.		**Set**	**P**

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS)
Nanoelectronics

Day & Date: Wednesday, 22-02-2023   Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos.1 and 2 are compulsory.
　　　　　　　　2) Attempt any three questions from Q. No. 3 to Q. No. 7
　　　　　　　　3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative.   **10**

1) As device or feature size is reduced towards a nanometer, more and more purely _____ begin to emerge.
　a) classical effect　　　　　　　b) quantum effect
　c) Nanoelectronics　　　　　　　d) all of these

2) The hetero-junctions semiconductors are based on _____ row compounds.
　a) III-IV　　　　　　　　　　　b) IV-V
　c) III-V　　　　　　　　　　　　d) IV-III

3) The triangular well wave functions are _____ due to the asymmetry of the potential well.
　a) neither symmetric or antisymmetric
　b) symmetric
　c) neither asymmetric or antisymmetric
　d) antisymmetric

4) The superlattice consists of a _____ set of Multiple Quantum Well (MQW).
　a) irregular　　　　　　　　　　b) regular
　c) periodic　　　　　　　　　　　d) none of these

5) For parabolic well, the energy levels (E_n) are proportional to _____.
　a) $n^{2/3}$　　　　　　　　　　　b) n
　c) n^2　　　　　　　　　　　　　d) $n^{1/3}$

6) The DOS for 2DEG system exhibits _____ shaped energy dependence.
　a) triangular　　　　　　　　　　b) parabolic
　c) line　　　　　　　　　　　　　d) staircase

7) The MBE technique is important for fabrication of _____ DEG system.
　a) 2　　　　　　　　　　　　　　b) 1
　c) 0　　　　　　　　　　　　　　d) 3

8) The operation of negative differential resistor (NDR) quantum well electron device is based on _____.
　a) quantum confined stark effect
　b) resonant tunnel effect
　c) Both a and b
　d) None of these

9) The _____ is the organic semiconductors.
　a) PolyPhenyleneVinylene (PPV)　b) PolyFluOrene (PFO)
　c) C-60　　　　　　　　　　　　d) all of these.

10) If characteristics $\lambda \geq$ Lx, Ly and Lx, Ly $\ll$ Lz then it stands for quantum.
    a) dot   b) wire
    c) well   d) bulk

B) Write True or False.   **06**
1) The electron energies in the quantum well obtained for infinite well and finite well are do not differ too much.
2) The modulation doped hetero-junctions gives low frequency transistors, MODFET.
3) The quantum wire is effectively one dimensional electron gas system.
4) The DOS for 2DEG system exhibits staircase shaped energy dependence.
5) The multiple quantum wells (MQW) are formed by single quantum well.
6) The Coulomb Blockade voltage range is in between -e/2C and + e/2C.

Q.2 Answer the following.   **16**
1) Explain the quantum wire and dot with respect to the characteristics length.
2) Discuss the limitations of microelectronics.
3) Explain Split-Gate technique.
4) Explain the square quantum well of finite depth.

Q.3 a) Explain the fabrication methods of nanomaterials.   **09**
    b) Explain the modulation doped quantum wells.   **07**

Q.4 a) Explain the parabolic and triangular quantum well.   **10**
    b) Write a note on concept of superlattice.   **06**

Q.5 a) Explain in detail basic properties of two-dimensional semiconductor nanostructures.   **10**
    b) Write a note on quantum dots.   **06**

Q.6 a) Explain the Resonant tunnelling effect and discuss the three terminals Resonant tunnelling devices.   **10**
    b) Write a note on Multiple Quantum Well (MQW).   **06**

Q.7 a) Explain in detail Single Electron Transistor.   **09**
    b) Explain in detail Heterojunctions semiconductors.   **07**

Seat No.

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS)
Mechatronics and Industrial Automation

Day & Date: Thursday, 23-02-2023   Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. 1 and Q.2 are Compulsory
      2) Attempt any three questions from Q.3 to Q.7
      3) Figure to right indicate full marks.

Q.1 **A)** **Choose correct alternative.**   **10**

1) The common communication protocol used in PLC are _____.
  a) Profibus   b) Ethernet
  c) RS- 232   d) All of these

2) The SCADA is a _____.
  a) Software   b) Process
  c) System   d) Hardware

3) For a 16-bit register, which is the largest integers number a PLC counter function can reach _____.
  a) 32,768   b) 65,536
  c) 65,535   d) 32,767

4) Ladder logic programming consists primarily of _____.
  a) Function blocks with connecting lines
  b) Logic gate symbols with connecting lines
  c) Virtual relay contacts and coils
  d) Text-based code

5) A _____ is output device of PLC.
  a) Switch   b) Coil
  c) Temperature sensor   d) LVDT

6) RTU stands for _____.
  a) Remote Terminal Unit
  b) Real Terminal Unit
  c) Remote Transmitter Unit
  d) All of these

7) The measurement system made up of basic elements are _____.
  a) Sensor   b) Signal conditioning
  c) Display   d) All of these

8) The range of control of controller _____ due to presence of offset.
  a) Increases   b) Remains constant
  c) Decreases   d) None of these

9) DCS supplier use _____ type of display.
  a) Group display   b) Graphic display
  c) Detail display   d) All of these

10) PLC is a _____.
  a) Electro mechanical device   b) Solid state device
  c) Mechanical device   d) Electrical device

B) **State true/false.** 06
1) A Mechatronics system contains feedback.
2) First Generation SCADA system known as distributed SCADA system.
3) Visual observation is advantage of PLC.
4) The PLC was invented by Dick Morley.
5) In PLC ladder diagram, the MCR terns the following specified number of lines to the OFF state.
6) Interface design is an example of hardware integration.

Q.2 **Answer the following.** 16
a) Define the mechatronics and write its application.
b) Explain types of SCADA Protocols.
c) What is mean by Industrial Automation.
d) Write the Advantages and Disadvantages for DCS system.

Q.3 a) Explain in detail IO modules and their characteristics. 08
b) Explain in details registers of PLC. 08

Q.4 a) Explain the basic architecture of CCS system and write its advantages and Disadvantages 10
b) Write note on Real Time Mechatronics systems. 06

Q.5 a) Explain the Display unit for the DCS system. 08
b) Discuss Modeling of measurement system. 08

Q.6 a) Explain in detail about remote terminal unit (RTU). 08
b) Define system. Explain in detail design Process of system in mechatronics. 08

Q.7 a) Explain in detail the architecture of the PLC. 10
b) Write note on Timer Function of PLC. 06

Seat No.		Set	P

M.Sc. (Semester – IV) (New) (CBCS) Examination: Oct/Nov - 2022
ELECTRONIC SCIENCE
Mixed Signal Based SoC Design

Day & Date: Thursday, 23-02-2023   Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory
              2) Attempt any three questions from Q. No. 3 to Q. No. 7
              3) Figure to right indicates full marks.

Q.1 A) Choose the correct alternative from the options.   **10**

1) VC1 is derived from _____.
  a) VC2   b) PLL
  c) VC3   d) Sysclk

2) The PSoC1 device from Cypress comprises an array of _____ configurable digital blocks.
  a) 12   b) 16
  c) 24   d) 4

3) In $\Delta\Sigma$ ADC the signal is _____ .
  a) oversampled   b) sampled
  c) continuous time   d) All of these

4) The global IO ports can be configured in _____ modes.
  a) 2   b) 4
  c) 6   d) 8

5) PSoC1 consists of _____ as processing core.
  a) ARM   b) ARM Cortex
  c) 8051   d) M8C

6) In PSoC1 the array of analog blocks contains _____ number of switched capacitor blocks.
  a) 4   b) 8
  c) 16   d) 32

7) In case of PSoC devices the Boot program is stored in _____.
  a) SRAM   b) SROM
  c) Flash   d) PROM

8) In switched capacitor inverting amplifier, the gain is given by A = ____.
  a) CA/CF   b) CF/CA
  c) RF/FA   d) CA x CF

9) In case of switched capacitor programmable analog blocks the clocks should be _____.
  a) Out of phase with same frequency
  b) In phase with different frequency
  c) In Phase with same frequency
  d) All of these

10) Placement define _____ of logic clls.
  a) size   b) location
  c) interconnection   d) length of interconnection

B) Write true/false   **06**
   1) The high precision clock is derived from external source of 32.768 KHz frequency.
   2) M8C has 5 internal register.
   3) The clocking of the modules in PSoC1 can use nine different clocks.
   4) In PSoC1 address bus and data bus are separate.
   5) The quantizer used in delta sigma ADC decides the resolution.
   6) BiCMOS is the combination of two CMOS.

Q.2 Answer the following questions.   **16**
   1) Write a note on Programmable Gain Amplifier.
   2) Draw a diagram for summing amplifier based on switched Capacitor.
   3) Write a note on System Buses.
   4) Characteristics of Mixed Signal VLSI design.

Q.3 Answer the following questions.
   1) What do you mean by mixed signal based SoC design? Discuss the salient features of Cypress programmable System on Chip.   **08**
   2) Describe switched capacitor block as inverting and non-inverting amplifier.   **08**

Q.4 Answer the following questions.
   1) Draw a block diagram of general architecture of PSoC devices.   **08**
   2) With block diagram describe an array of programmable analog block.   **08**

Q.5 Answer the following question.
   1) With block diagram describe architecture of M8C core.   **08**
   2) Describe in detail programmable UART block of PSoC device.   **08**

Q.6 Answer the following questions.
   1) With suitable block diagram describe the design of mixed signal-based system on chip for measurement of relative humidity.   **10**
   2) Describe in detail SPI block of PSoC device.   **06**

Q.7 Answer the following questions.
   1) What is principle of Switched Capacitor? Describe in detail the architecture of Type C SC block.   **10**
   2) Write a note on memory subsystem.   **06**

Seat No.	

M.Sc. (Semester - IV) (Old) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS)
Microwave Devices, Antennas and Measurements

Day & Date: Monday, 20-02-2023　　　　　　　　　　　Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
　　　　　　　　2) Attempt any Three questions from Q.No.3 to Q.No.7.
　　　　　　　　3) Figures to the right indicate full marks.

Q.1　A)　Choose Correct Alternative.　　　　　　　　　　　　　　　　**10**

1) The power gain of a half wave dipole with respect to an isotropic radiator is _____.
   a) 1db　　　　　　　　　　　　b) 2.15db
   c) 3db　　　　　　　　　　　　d) 6db

2) The scattering parameters are used to indicate_____.
   a) Permittivity and permeability
   b) Electric and magnetic field intensities
   c) Reflection and transmission coefficients
   d) Frequency and wavelength

3) GaAs is used in fabricating Gunn diode. Gunn diode is_____.
   a) bulk device
   b) sliced device
   c) made of different types of semiconductor layers
   d) None of the mentioned

4) The dominant wave should have _____.
   a) no phase shift
   b) no attenuation
   c) highest cut-off frequency
   d) lowest cut-off frequency

5) The _____ microwave tube uses buncher and catcher cavities.
   a) Magnetron
   b) Klystron
   c) Reflex Klystron
   d) Travelling Wave tube

6) Polarization of EM wave is in _____.
   a) The direction of electric field
   b) The direction of magnetic field
   c) The directions of electric and magnetic field
   d) None of the mentioned

7) _____ of the following is not an Omni-directional antenna.
   a) Half-Wave dipole　　　　　　b) Logic Periodic
   c) Discone　　　　　　　　　　d) Marconi

8) Under ideal conditions, when a PIN diode is used as a switch, the switch must have_____ insertion loss in the ON state.
   a) Zero
   b) Maximum
   c) Average
   d) Insertion loss cannot be defined for a switch

9) Maxwell's equation for electromagnetic waves in a waveguide is _____.   Type
   a) $\nabla \times E = -j\omega\mu$(vector E)   b) $\nabla \times E = -j\omega\mu$(vector H)
   c) $\nabla \times H = -j\omega\mu$(vector H)   d) $\nabla \times H = -j\omega\mu$(vector H

10) The correct sequence to find H, when D is given is _____.
    a) D-E-B-H
    b) D-B-E-H
    c) It cannot be computed from the data given
    d) D-H

B) State True/False.   06
   1) The SWR on a transmission line is infinity; the line is terminated in complex impedance.
   2) A hollow rectangular waveguide does not support TEM mode of propagation.
   3) The first Maxwell law is based on Faraday and Lenz law.
   4) A major disadvantages of klystron amplifier is Low bandwidth.
   5) The parameters S_{11} and S_{22} indicate the transmission coefficients.
   6) When the separation between two lines that carry the TEM wave approaches λ the wave tends to be radiated.

Q.2 Answer the following.   16
   1) What is Microwave? What are the applications of microwave?
   2) Write a note on Multicavity Klystron Amplifiers.
   3) What is antenna? Explain Horn Antenna.
   4) Distinguish between Transmission Line and Waveguide.

Q.3 a) Write a note on Rat Race Junction. Explain Directional Couplers.   08
      b) Derive the wave equation in good conductor.   08

Q.4 a) What are the Maxwell's equations? Explain with its boundary conditions.   10
      b) Write a note on Gunn Effect. Explain InP Diode.   06

Q.5 a) Explain Modes in waveguides. Derive the wave equation for TE and TM waves.   08
      b) What is SWR? Explain SWR of impedance and admittance.   08

Q.6 a) Write a note on transmission line. Derive the transmission line equation.   08
      b) Discuss Slot and Microstrip Antennas.   08

Q.7 a) A certain transmission line has a characteristics impedance is [75+j0.01Ω] and is terminated in load impedance of [70+j50Ω] compute.   10
      i)   Reflection coefficient (Γ)
      ii) Transmission coefficient (T)
      iii) $T^2 = \frac{zl}{zo}[1-\Gamma_1^2]$
      b) Explain Reflex Klystrons tube and RWH theory.   06

Seat No.	

M.Sc. (Semester - IV) (Old) (CBCS) Examination: Oct/Nov-2022
(ELECTRONICS)
Networking and Data Communications

Day & Date: Tuesday, 21-02-2023   Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question Nos.1 and 2 are compulsory.
              2) Attempt any three questions from Q. No. 3 to Q. No. 7.
              3) Figure to right indicate full marks.

Q.1 A) Choose the correct alternative for the following.   **10**

1) _____ layer in the OSI model is responsible for process to process delivery of the message.
    a) Network   b) Transport
    c) Physical   d) Data Link

2) _____ technique uses the voltage level to determine the value of the bit.
    a) RZ   b) NRZ-I
    c) Biphase   d) NRZ-L

3) _____ topology has point-to-point dedicated link with only two devices on either side of it.
    a) Bus   b) Mesh
    c) Ring   d) Star

4) _____ modulation technique is used for ADSL.
    a) DMT   b) DSLAM
    c) ADSL modem   d) 2B1Q

5) _____ is the feature of fast Ethernet.
    a) CSMA/CD   b) Auto negotiation
    c) CSMA/CA   d) CSMA

6) _____ is one of the techniques for data rate management in TDM.
    a) Multiple-Slot allocation   b) Frame cancellation
    c) Time Slot allocation   d) Bit stuffing

7) L2CAP of Bluetooth is equivalent to _____ sub layer in LANs.
    a) MAC   b) Baseband
    c) PDU   d) LLC

8) The four layer of SONET can be compared to _____ layers of the OSI.
    a) Data link and network   b) Physical and data link
    c) Network and transport   d) Transport and session

9) _____ of the following is not a digital to analog conversion technique.
    a) FSK   b) ASK
    c) AM   d) PSK

10) Fast ethernet provides the data rate of _____ Mbps.
    a) 100   b) 10
    c) 20   d) 50

B) Write True/False. 06
1) The data link layer of OSI divides stream of bits into frames.
2) Packet switched network provides resource reservation.
3) Bipolar AMI uses alternation in positive and negative voltages to represent binary 0.
4) Physical address provided by NIC to a station is of 6-byte.
5) Message confidentiality is one of the security services.
6) Bluetooth is a wired LAN technology.

Q.2 Answer the following. 16
1) Explain any two responsibilities of data link layer in OSI model.
2) Explain the four types of addressing used in data communication.
3) Explain any one service of E-mail. Explain in brief message authentication in Internet Security Services.
4) Draw the digital signal to represent data pattern 10010 using AMI and Psuedoternary coding schemes.

Q.3 Answer the following.
a) Explain TCP/IP model in detail. 10
b) What are the causes of transmission impairment? Explain each in detail. 06

Q.4 Answer the following.
a) Describe the operation of circuit switched network. 08
b) What are the connecting devices used in LANs? Explain any two of them in detail. 08

Q.5 Answer the following.
a) Describe the architecture of ATM protocol. 10
b) Draw the PPP frame format. Enlist the services provided by the protocol. 06

Q.6 Answer the following.
a) Describe the HDLC protocol. 08
b) Explain any two techniques for translation from IPv4 to IPv6 address. 08

Q.7 Answer the following.
a) Explain in detail the architecture of WWW. 10
b) Write a note process to process delivery at the transport layer. 06

Seat No.		**Set**	**P**

M.Sc. (Semester - IV) (Old) (CBCS) Examination: Oct/Nov-2022
(ELECTRONIC)
Nanoelectronics

Day & Date: Wednesday, 22-02-2023　　　　　　　　　　Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
　　　　　　　　2) Attempt any three questions from Q. No. 3 to Q. No. 7
　　　　　　　　3) Figure to right indicate full marks.

Q.1　A)　Choose Correct Alternative.　　　　　　　　　　　　　　　　　**10**

1) For a _____ photoresist, the resist material is initially insoluble and through a chemical reaction when exposed to light it become soluble.
　　a) positive　　　　　　　　　　b) negative
　　c) lithography　　　　　　　　d) IC

2) The hetero-junctions are based on _____ row compounds.
　　a) III-IV　　　　　　　　　　　b) III-V
　　c) IV-V　　　　　　　　　　　d) IV-III

3) As device or feature size is reduced towards a nanometer, more and more purely _____ begin to emerge.
　　a) classical effect　　　　　　b) quantum effect
　　c) nanoelectronics　　　　　　d) All of these

4) The concept of SET is based on the behavior of _____ dimensional nanostructures.
　　a) zero　　　　　　　　　　　b) two
　　c) one　　　　　　　　　　　d) three

5) The triangular well wave functions are _____ due to the asymmetry of the potential well.
　　a) neither symmetric or antisymmetric
　　b) symmetric
　　c) neither asymmetric or antisymmetric
　　d) antisymmetric

6) The split gate technique is used to _____ the electron gas dimensionality.
　　a) increase　　　　　　　　　b) decrease
　　c) equal　　　　　　　　　　d) none of these

7) The OLED does not requires a _____.
　　a) filter　　　　　　　　　　b) backlight
　　c) both a and b　　　　　　　d) frontlight

8) The operation of NDR quantum well electron device is based on _____.
　　a) Quantum confined stark effect　　b) Resonant Tunnel effect
　　c) Both a and b　　　　　　　　　d) None of these

9) The hot electron are normally travels from _____ bandgap semiconductor to _____ bandgap semiconductor.
　　a) wide, smaller　　　　　　　b) small, wider
　　c) wide, equal　　　　　　　　d) equal, wide

10) The _____ is the organic semiconductors.
   a) PolyPhenyeneVinylene (PPV)   b) PolyFluOrene (PFO)
   c) C-60   d) All of these

B) State True/False. **06**
   1) The modulation doped hetero-junctions gives low frequency transistors, MODFET.
   2) The motion of particle in the nanoworld is determined by wave and quantum mechanics.
   3) For parabolic well, the energy levels (En) are proportional to index n.
   4) The quantum wire is effectively zero dimensional electron gas system.
   5) The Multiple Quantum Wells (MQW) are formed by multiple quantum well.
   6) The Coulomb Blockade voltage range is in between –e/2C and + e/2C.

Q.2 Answer the following. **16**
   1) Discuss the limitations of microelectronics.
   2) Explain the square quantum well of finite depth.
   3) Explain the concept of superlattice.
   4) Discuss resonant tunneling effect.

Q.3 a) Explain the fabrication methods of nanomaterials. **10**
   b) Write a note on quantum wire. **06**

Q.4 a) Explain in detail basic properties of two-dimensional semiconductor nanostructures. **10**
   b) Write a note on any three characteristics length in nanostructures. **06**

Q.5 a) Explain in detail Heterojunctions. **10**
   b) Write a note on Coulomb Blockade. **06**

Q.6 a) Explain the parabolic and triangular quantum well. **10**
   b) Write a note on organic semiconductor. **06**

Q.7 a) Explain in detail Single Electron Transistor. **10**
   b) Write a note on multiple quantum well. **06**

Seat No.

M.Sc. (Semester – IV) (Old) (CBCS) Examination: Oct/Nov-2022
(ELECTRONIC)
Mechatronics and Industrial Automation

Day & Date: Thursday, 23-02-2023   Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos. 1 and 2 are compulsory
                 2) Attempt any three questions from Q. No. 3 to Q. No. 7
                 3) Figure to right indicate full marks.

Q.1   **A)**   **Choose the correct alternative from the options.**   **10**

1) Ladder logic programming consists primarily of _____ .
   a) Virtual relay contacts and coils
   b) Logic gate symbols with connecting lines
   c) Function blocks with connecting lines
   d) Text-based code

2) PLC can be ___ in plant to change the sequence of operation.
   a) only programmed   b) only reprogrammed
   c) programmed and reprogrammed   d) able to give a set point

3) In a PLC, the scan time refers to the amount of time in which _____ .
   a) the technician enters the program
   b) timers and counters are indexed by
   c) one "rung" of ladder logic takes to complete
   d) the entire program takes to execute

4) An OR function implemented in ladder logic uses _____ .
   a) Normally-closed contacts in series
   b) Normally-open contacts in series
   c) Normally-closed contacts in parallel
   d) A single normally-closed contact

5) The _____ of PLCs can be done in very little time.
   a) Programming   b) Installation
   c) Commissioning   d) All of the above

6) Which of the following cannot be an input that is given to the PLC?
   a) Coil   b) Manual switches
   c) Relays   d) Sensors

7) What is the full form of SCADA?
   a) Supervisory Control and Document Acquisition
   b) Supervisory Control and Data Acquisition
   c) Supervisory Column and Data Assessment
   d) None of these

8) The difference between online and offline PLC programming is _____ .
   a) Whether the PLC is running or stopped
   b) Whether the programming PC has internet connectivity
   c) The type of programming cable used
   d) Where the edited program resides

9) The acronym PLC stands for _____.
   a) Pressure Load Control
   b) Programmable Logic Controller
   c) Pneumatic Logic Capstan
   d) PID Loop Controller

10) In PLC programming, a retentive function is one that _____.
   a) Defaults to the "on" state   b) Defaults to the "off" state
   c) Cannot be edited or deleted   d) Is not reset after a power cycle

Q.1 B) State true or false. **06**
   1) The +5Volt is nominal DC voltage given to PLC.
   2) The Boolean expression is not used for PLC programming.
   3) Solenoids, lamps, motors are connected to Digital output.
   4) RTU stands for Remote Transfer Unit.
   5) The Ladder diagram is most popular language for PLCs.
   6) In PROFIBUS DP the DP stands for Decentralized Periphery.

Q.2 Answer the following questions. **16**
   1) What do you mean by PLC's instructions
   2) Compare Open and closed loop systems
   3) Explain in detail Modbus
   4) List the advantages of DCS over CCS

Q.3 Answer the following questions.
   1) Draw the Architecture of programmable Logic controllers and explain in detail. **08**
   2) List the advantages and disadvantages of mechatronics systems. **08**

Q.4 Answer the following questions.
   1) Explain in detail Display units of DCS. **10**
   2) Write note on modeling of the system measurement. **06**

Q.5 Answer the following question.
   1) Draw Ladder diagram program to ON-OFF the out device and its equivalent circuit diagram. **08**
   2) Explain in detail types of SCADA system. **08**

Q.6 Answer the following questions.
   1) What is ladder diagram? Explain with suitable example. **10**
   2) Explain sequencer function in detail. **06**

Q.7 Answer the following questions.
   1) Explain in detail arithmetic functions of PLC. **10**
   2) Write note on IO modules and their characteristics. **06**