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

M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Advanced Microcontroller (2313101)

Day & Date: Friday, 05-01-2024   Max. Marks: 60
Time: 03:00 PM To 05:30 PM

Instructions: 1) All Questions are Compulsory.
             2) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative.   **08**

1) Sinking and sourcing current of AVR microcontroller is _____.
    a) 20   b) 25
    c) both a-and-b   d) None of these

2) PIC 16F877 supports _____ ports.
    a) 3   b) 5
    c) 4   d) 2

3) AVR microcontroller have _____ General Purpose Resistors.
    a) 35   b) 34
    c) 33   d) 32

4) in AVR microcontroller X register is combination of _____.
    a) R26 and R27   b) R28 and R29
    c) R30 and R31   d) None of the these

5) To display data on Smart LCD the LCD line "En" is _____.
    a) Active high   b) Active Low
    c) Active high to active low   d) Active low to Active high

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

7) The _____ is the data direction register.
    a) DDRx   b) PORTx
    c) PINx   d) all of these

8) Address of Interrupt Vector in PIC 16F877 is _____.
    a) 0004h   b) 0000h
    c) 0001h   d) 0002h

B) State true/false.   **04**

1) PIC 16F877 has 32 general-purpose I/O pins.
2) PIC 16F877 has a maximum of 5 PWM channels.
3) The AVR ATmega8 has a 32-bit instruction set architecture.
4) AVR ATmega8 uses the Harvard architecture.

Q.2 **Answer the following.(Any Six)** **12**
1) Write any four features of AVR microcontroller.
2) Explain reset circuit of PIC microcontroller.
3) Explain the use of Integrated Development Tools for AVR microcontroller.
4) Explain the need of instruction set for Microcontroller and give instruction format for PIC microcontroller with suitable example.
5) Draw the architecture of AVR microcontroller.
6) Write note on sleep mode of PIC microcontroller.
7) Write program for LED blinking using PIC microcontroller.
8) Compare PIC and AVR microcontroller.

Q.3 **Answer the following. (Any Three)** **12**
a) Write note on clock and reset circuit of AVR microcontroller with suitable diagram.
b) Write note on ports of PIC microcontroller.
c) Write note on watchdog timer of AVR microcontroller.
d) Write note of resistor bank of PIC microcontroller.

Q.4 **Answer the following. (Any Two)** **12**
a) Write note on arithmetic instruction of AVR microcontroller.
b) Explain Timers of PIC Microcontroller.
c) Explain interfacing of Relay with AVR microcontroller.

Q.5 **Answer the following. (Any Two)** **12**
a) Explain Analog to Digital Convertor (ADC) of AVR microcontroller.
b) Explain the USART of PIC microcontroller.
c) Explain interfacing of LCD with PIC microcontroller.

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M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Industrial Power Electronics (2313102)

Day & Date: Sunday, 07-01-2024   Max. Marks: 60
Time: 03:00 PM To 05:30 PM

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

Q.1   **A)**   **Select correct alternative for the following.**   **08**

1) A thyristor has _____ layers.
   a) 1   b) 2
   c) 3   d) 4

2) Inverter is also called as _____ converter.
   a) AC to pulsating DC   b) DC- AC
   c) DC to pulsating AC   d) DC-DC

3) Cycloconverter cannot not used in _____.
   a) AC voltage drives   b) static VAR generation
   c) Induction heating   d) DC operations

4) Input power factor for on- off controller is _____.
   a) $Vs.k$ b) $Vs.\sqrt{k}$
   c) $\sqrt{k}$ d) k

5) Three phase full converter gives _____ value of Vdc for $\alpha > \pi/2$.
   a) zero   b) positive
   c) negative   d) constant

6) The duty cycle of single phase full wave controller is _____.
   a) $\left(\dfrac{n}{n+m}\right)$ b) $\sqrt{\left(\dfrac{n}{n+m}\right)}$
   c) $\sqrt{\left(\dfrac{m}{n+m}\right)}$ d) $\left(\dfrac{n}{m-n}\right)$

7) Semi converter has _____ quadrant operation.
   a) two   b) one
   c) three   d) four

8) Fixed frequency DC can be converted to variable DC by using _____.
   a) inverter   b) cycloconverter
   c) AC controllers   d) chopper

   B)   **Write True or False**   **04**
1) Cycloconverter uses capacitor to prevent failure.
2) Bidirectional ac voltage controller uses the principle of phase control.
3) Three phase full converter exhibits four quadrant operation.
4) Inverters can be used in standby power supply.

Q.2 Answer the following (Any Six) 12
a) Explain the operation of class A chopper.
b) Give the classification of inverters.
c) State any two applications of AC voltage controllers
d) Compare uncontrolled and controlled rectifiers.
e) Define the term harmonics. Define any one technique to reduce in semi converters.
f) Discuss the concept of phase control in AC voltage controllers.
g) Compare step up and step down cycloconverters
h) Explain the operation of AC choppers.

Q.3 Answer the following (Any Three) 12
a) Explain the operation of current source inverters.
b) Discuss the working single phase dual converter.
c) Draw the circuit diagram of three phase to single phase cycloconverter.
d) Explain the operation of class E chopper.

Q.4 Answer the following (Any Two) 12
a) Explain the working of single phase unidirectional controller.
b) Discuss the working principle of inverter.
c) Explain the time ratio control technique in choppers.

Q.5 Answer the following (Any Two) 12
a) Discuss the working of three phase half controlled rectifiers.
b) Explain the three phase half wave controllers with resistive load.
c) Discuss the Mc-Murrey half bridge inverter.

Seat No.	

M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Numerical Methods (2313108)

Day & Date: Tuesday, 09-01-2024   Max. Marks: 60
Time: 03:00 PM To 05:30 PM

Instructions: 1) All Questions are compulsory.
              2) Figure to right indicate full marks.

Q.1 A) Choose correct alternative.   **08**

1) 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 ∞

2) Cramer's Rule fails for _____.
   a) Determinant > 0 b) Determinant < 0
   c) Determinant $= 0$ d) Determinant = non-real

3) The L (eat 1/a) is _____.
   a) $1/s(s + a)$ b) $1/s(s - a)$
   c) $1/(s\,a)$ d) $1/(s + a)$

4) In the least square method, we use _____ to find the value of unknowns.
   a) normal equations   b) regression equations
   c) general equations   d) auxiliary equations

5) A matrix B and _____ will have the same determinant.
   a) Its adjoint   b) Its inverse
   c) Its echelon matrix   d) Its transpose

6) The voltage across the LC combination in a series RLC circuit is _____.
   a) 0   b) 1
   c) 2   d) 3

7) Laplace transform of integral function is _____.
   a) $s[f(0) + f(s)]$ b) $1/s[f(0) + f(s)]$
   c) $s[f(s) + f(0)]$ d) $1/s[f(s) + f(0)]$

8) Relative error$(e_r) = $ _____.
   a) Absolute error/ true value
   b) Actual value - approximate value
   c) (Absolute error/ true value) $\times$ 100
   d) None of the mentioned

B) State True /False.   **04**
1) Simpson's $3/8$ rule is Approximates $f(x)$ by a 3rd order polynomial.
2) If $f(t) = t^n$ where, 'n' is an integer greater than zero, then its Laplace Transform is t^{n+1}.
3) The Laplace Transform of the function $f(x) = x$ is $1/p^2, p > 0$.
4) Gauss Jordan is the examples of the Iterative methods.

Q.2 Answer the following. (Any Six)   **12**
   a) Write a note on curve fitting.
   b) Round the given numbers to four significant figures.
      1) 38.46235
      2) 0.70029
   c) What is Relative error? How relative error is expressed in percentage?
   d) Write a note on Inverse Laplace transform.
   e) What is matrix? What are the different types of the matrices?
   f) Distinguish between interpolation and extrapolation.
   g) Define boundary value problems.
   h) Find LT of unitary function.

Q.3 Answer the following. (Any Three)   **12**
   a) Prepare divided difference table for following data.

x	2	4	5	7	8
y	3	43	138	778	1515

   b) What is error? Explain truncation error and rounding error.
   c) Find $L^{-1}\{1/(s-2) + 2/(s+5) + 6/s^4$
   d) Write a note LU factorization method.

Q.4 Answer the following. (Any Two)   **12**
   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.
   b) Solve the system of linear equations using matrix inversion method.
      $3x + y + 2z = 3$
      $2x - 3y - z = -3$
      $x + 2y + z = 4$
   c) State and prove that the Laplace transform of Derivatives function.

Q.5 Answer the following. (Any Two)   **12**
   a) State and prove that Final value theorem.
   b) Obtain empirical relation by using Newton's forward method of interpolation for fallowing set of points.

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

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

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

M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Research Methodology (2313103)

Day & Date: Thursday, 11-01-2024   Max. Marks: 60
Time: 03:00 PM To 05:30 PM

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

Q.1 A) Choose correct alternative.   **08**

1) A research paper is a brief report of research work based on _____.
   a) Primary Data only
   b) Secondary Data only
   c) Both Primary and Secondary Data
   d) None of the above

2) The _____ is process not needed in experimental research.
   a) Controlling   b) Observation
   c) Manipulation   d) Reference collection

3) Newton gave three basic laws of motion. This research is categorized as _____.
   a) Descriptive Research   b) Sample Survey
   c) Fundamental Research   d) Applied Research

4) A doctor studies the relative effectiveness of two drugs of Dengue fever. His research would be classified as _____.
   a) Descriptive Survey   b) Experimental Research
   c) Case Study   d) Ethnography

5) Research objectives include _____.
   a) Decision making   b) Build new concepts
   c) Eliminates old concepts   d) Only a and b

6) Sample value is called _____.
   a) Parameter   b) Statistic
   c) Variable   d) Data

7) Research process begins with _____.
   a) Identification of research problem
   b) Research design
   c) Collection of data
   d) Report writing

8) In the process of conducting research 'Formulation of Hypothesis' is followed by _____.
   a) Statement of Objectives   b) Analysis of Data
   c) Selection of Research Tools   d) Collection of Data

Q.1 B) **State True/False.** 04
1) If data is insufficient, then the research problem will exist.
2) Primary data can be collected by the researcher himself.
3) A null hypothesis is means there is difference between the variables.
4) Last stage of research process is analysis of data.

Q.2 **Answer the following. (Any Six)** 12
a) Define the research.
b) What are the objectives of the research.
c) State the features of research design.
d) State the features of good research problem.
e) State the principles of experimental research design.
f) State the characteristics of good data collection.
g) State the purpose of research report writing.
h) State the 7Cs of effective research writing.

Q.3 **Answer the following. (Any Three)** 12
a) Explain the qualitative research verses quantitative research.
b) Explain research methods and research methodology.
c) Explain the research problem.
d) Explain the characteristics of good report writing.

Q.4 **Answer the following. (Any Two)** 12
a) Give the types of research and explain it.
b) Explain the important concept of the research design.
c) What are the types of data analysis? And explain it.

Q.5 **Answer the following. (Any Two)** 12
a) What is secondary data collection? Explain it in detail.
b) Explain the techniques involved in defining a problem.
c) Explain the format of research paper writing.

Seat No.	

M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Numerical Methods (MSC21101)

Day & Date: Friday, 05-01-2024   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) If $f(t) = t\sin(at)$ then its Laplace Transform $f(t)$ is _____.
   a) $2as/(s^2 + a^2)^2$ b) $a/s^2 + a^2$
   c) Indeterminate   d) $\sqrt{\pi}/2\sqrt{s}$

2) Round the given number to decimal places: 24.5431 the number is _____.
   a) 24.5431   b) 24.543
   c) 24.55   d) 24.54

3) The z parameters form a matrix of the form _____.
   a) $[z_{11}\ z_{12}; z_{21}\ z_{22}]$ b) $[z_{11}\ z_{12}; z_{22}\ z_{21}]$
   c) $[z_{12}\ z_{11}; z_{21}\ z_{22}]$ d) $[z_{11}\ z_{22}; z_{12}\ z_{21}]$

4) Trapezoidal rule is _____.
   a) Approximates $f(x)$ by parabola
   b) Approximates $f(x)$ by a 3rd order polynomial
   c) Approximates $f(x)$ by straight line
   d) None of the mentioned

5) The voltage across the LC combination in a series RLC circuit is _____.
   a) 0   b) 1
   c) 2   d) 3

6) Cramer's Rule fails for _____.
   a) Determinant > 0 b) Determinant < 0
   c) Determinant $= 0$ d) Determinant = non-real

7) If $L\{F(t)\} = f(s), G(t) = \begin{cases} f(t-a), & t > a \\ 0 & t < a \end{cases}$ then $L\{G(t)\} =$ _____.
   a) $e^{as}f(s)$ b) $e^{-as}f(s)$
   c) $f(s-a)$ d) $f(s+a)$

8) In the least square method, we use _____ to find the value of unknowns.
   a) normal equations   b) regression equations
   c) general equations   d) auxiliary equations

9) A matrix B and _____ will have the same determinant.
   a) Its adjoint   b) Its inverse
   c) Its echelon matrix   d) Its transpose

10) Laplace transform of integral function is _____.
   a) $s[f(0) + f(s)]$ b) $1/s[f(0) + f(s)]$
   c) $s[f(s) + f(0)]$ d) $1/s[f(s) + f(0)]$

B) **State true/false.** 06
1) The inverse of a matrix exists if and only if it is a non-singular matrix.
2) If $f(t) = t^n$ where, 'n' is an integer greater than zero, then its Laplace Transform is t^{n+1}
3) Unit of inductance is Henry.
4) $B^{-1}AX = A^{-1}B$ the solution of system of equation in form of $AX = B$
5) The Laplace Transform of the function $f(x) = x$ is $1/p^2, p > 0$
6) The coefficients of the equation obtained during the elimination called pivots.

Q.2 **Answer the following.** 16
1) Write a note on Eigen values and vector.
2) Prepare divided difference table for following data

x	2	4	5	7	8
y	3	43	138	778	1515

3) Compute the value of the $I = \int_0^1 e^{-x}\,dx$ by using trapezoidal rule.
4) Prove that $L\{f'''(t)\} = s^3 f(s) - s^2 f(0) - sf'(0) - f''(0)$

Q.3 **a)** Find a value of $f(13)$ by using Newton's forward interpolation method. 08

x	10	20	30	40	50
y	1.11	1.81	2.61	3.60	4.86

b) Solve the system of linear equations using matrix inversion method. 08
$3x + y + 2z = 3$
$2x - 3y - z = -3$
$x + 2y + z = 4$

Q.4 **a)** State and prove that the Laplace transform of Derivatives and Integral function. 10
b) Using least square fitting process fit the following data to straight line. 06

x	0	1	2	3	4
y	2	4	6	8	10

Q.5 **a)** Write a note on T network. Find out the tridiagonal matrix for $R - 2R$ ladder network in numerical analysis. 08
b) What is error? Explain Absolute error and Relative error and calculate absolute and relative errors, comment on the result. 08
i) True value $= 1 \times 10^{-6}$, approximate value $= 0.5 \times 10^{-6}$
ii) True value $= 1 \times 10^6$, approximate value $= 0.99 \times 10^6$

Q.6 **a)** i) Find $L^{-1}\{1/(s-2) + 2/(s+5) + 6/s^4\}$ 08
ii) Evaluate $L^{-1}\{[1/(s-4)^5] + [5/(s-2)^2 + 5^2] + [s + 3/(s+3)^2 + 6^2]\}$
b) Write a note on pivoting. Solve the system of equations using gauss Jordan method. 08
$2x_1 + x_2 + 2x_3 + x_4 = 6$
$6x_1 - 6x_2 + 6x_3 + 12x_4 = 36$
$4x_1 + 3x_2 + 3x_3 - 3x_4 = -1$
$2x_1 + 2x_2 - x_3 + x_4 = 10$

Q.7 **a)** What is Inverse Laplace transform? Find $L^{-1}\{1/(s-1)^5(s+2)\}$. 10
b) Derive the expression for the second order least square fitting. 06

Seat No.

Set **P**

M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Instrumentation Design (MSC21102)

Day & Date: Sunday, 07-01-2024   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) In NLC type of Liquid Crystal Display molecules are _____align.
   a) Orderly   b) Randomly
   c) Both a and b   d) None of the mentioned

2) Which proximity sensor detects positioning of an object?
   a) Optical   b) Inductive
   c) Capacitive   d) All of these

3) 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

4) The popular Digital Panel Meter (DPM) is well known example of _____ data accusation system.
   a) Single   b) Dual
   c) Multi   d) None of these

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

6) The _____ switch is a type of sensor that detects the presence and absences of an object.
   a) Active   b) Passive
   c) Limit   d) All of these

7) In Piezoelectric transducer Quartz, Rochelle salt and _____ crystal used respectively.
   a) Jasper   b) Citrine
   c) Barium titanate   d) None of these

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

9) 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

10) V to I converted with grounded load the operational amplifier connected in _____ mode.
   a) Inverting
   b) Non-inverting
   c) Differential
   d) All of these

B) State true or false. 06
   1) For the sensitive and accurate measurements offsetting and linearizing is necessary.
   2) The AD524 is input for both powers-on and power-off fault conditions.
   3) Temperature compensation, in bridge circuit arrangement, is affected by using dummy strain gauges.
   4) Piezoelectric crystals are used for measurement of static changes.
   5) The SY-HS220 is the precision temperature sensor.
   6) The noise caused due to EM waves is called as EM noise.

Q.2 Answer the following. 16
   a) Short note on single channel DAS.
   b) What is an X-Y recorder? Explain its application.
   c) Write a short note on selection criteria for transducers.
   d) Explain digital display unit LCD.

Q.3 Answer the following.
   a) What is instrumentation system? Design instrumentation system for measurement of humidity. 08
   b) Explain signal transmission in detail. 08

Q.4 Answer the following.
   a) Explain in detail noise effect guarding techniques. 10
   b) What is isolation amplifier? Explain model 289. 06

Q.5 Answer the following.
   a) Explain static and dynamic characteristics of sensor. 08
   b) Explain the interfacing circuit for PT100 and AD590 to microcontroller. 08

Q.6 Answer the following.
   a) What is mean by recorders? Explains in details its types. 08
   b) Explain construction and working principle of LVDT. 08

Q.7 Answer the following.
   a) What is a signal conditioners? Explains model 2B30 and model 2B35. 10
   b) Explain AC bridges. 06

Seat
No.

M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Power Electronics (MSC21103)

Day & Date: Tuesday, 09-01-2024   Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. Nos.1and 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) Select correct alternative for the following.   **10**

1) Input power factor for on- off controller is _____.
   a) Vs. k   b) $\sqrt{k}$
   c) Vs. $\sqrt{k}$ d) k

2) Semi converter has _____ quadrant operation.
   a) two   b) one
   c) three   d) four

3) With $\alpha < 60°$ three phase semi converter provides _____ pulse/s at the output.
   a) 1   b) 2
   c) 4   d) 6

4) The duty cycle of single phase full wave controller is _____.
   a) $\sqrt{(\dfrac{m}{n+m})}$ b) $\sqrt{(\dfrac{n}{n+m})}$
   c) $(\dfrac{n}{n+m})$ d) $(\dfrac{n}{n-m})$

5) Dual convertor allows the firing angle to be _____ to operate in rectification mode.
   a) $< \pi$ b) $< \pi/2$
   c) $> \pi$ d) $> \pi/2$

6) AC chopper uses _____ technique of power factor improvement.
   a) EAC   b) SPWM
   c) CSI   d) PWM

7) Class E choppers has _____ quadrant operation.
   a) Two   b) one
   c) three   d) four

8) Practically, the nature of the output of single phase bridge inverter is _____.
   a) Square wave   b) Triangular wave
   c) Sawtooth wave   d) Sine wave

9) 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

10) Fixed frequency DC can be converted to variable DC by using _____.
   a) Inverter   b) Cycloconverter
   c) AC controllers   d) Chopper

B) Write True or False. 06
1) Cycloconverter uses intergroup reactor to prevent failure.
2) Bidirectional ac voltage controller uses the principle of phase control.
3) Asymmetrical configuration of single phase semi converter uses thyristor for free-wheeling mode.
4) The output current of current source inverter depends upon the nature of the load.
5) Cycloconverters can be used to drive high power loads.
6) Class A chopper is also known as step up chopper.

Q.2 Answer the following. 16
a) Define choppers. Describe its classification.
b) Draw a neat labeled circuit diagram of Mc Murray half bridge inverter.
c) Draw a neat labeled circuit diagram of three phase Dual converter.
d) Explain PWM technique for power factor improvement.

Q.3 Answer the following.
a) Discuss any two chopper control techniques. 08
b) Describe the principle of phase control in AC voltage controllers. 08

Q.4 Answer the following.
a) Explain the working of single phase full controlled bridge rectifier with R-L load. 10
b) Discuss the operation of class B chopper. 06

Q.5 Answer the following.
a) Explain the working of single phase half controlled bridge rectifier with R-L load. 10
b) Explain the working of single phase step up cycloconverter. 06

Q.6 Answer the following.
a) Describe the operation of single phase full bridge inverter in detail. 10
b) Draw a neat labeled diagram of three phase full wave controller for R-L load 06

Q.7 Answer the following.
a) Explain the working of single phase bridge type cycloconverter. 10
b) Explain operating principle of inverter. Discuss its types. 06

Seat No.

M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Advanced Microcontrollers (MSC21108)

Day & Date: Thursday, 11-01-2024   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) Which instruction is applicable to set any bit while performing bitwise operation settings?
   a) bcf   b) bsf
   c) bst   d) both a & b

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

3) What does UART stand for?
   a) universal asynchronous receiver transmitter
   b) unique asynchronous receiver transmitter
   c) universal address receiver transmitter
   d) unique address receiver transmitter

4) Which flags of status register are most likely to get affected by the single-cycle increment and decrement instructions?
   a) P Flags   b) C Flags
   c) OV Flags   d) Z Flags

5) In AVR, when is the V flag set?
   a) there is a carry from D7 bit
   b) there is a carry from D6 to D7 bit
   c) when carry is generated only from D3 to D4
   d) both a and c

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) Which bits play a crucial role in specifying the details or reasons associated with the system wake-up in WDT?
   a) $\overline{PD}$ & $\overline{TO}$ b) C & Z
   c) DC & RPO   d) All of the above

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

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

B) State true or false. 06
1) The ATmega8 is a low-power CMOS 8-bit microcontroller based on the AVR RISC architecture.
2) The Status register of PIC16F877A contains the arithmetic status of the ALU, the Reset status and the bank select bits for data memory.
3) The Port C of ATmega8 is an 10-bit bi-directional I/O port with internal pull-up resistors
4) The PIC16F877A have 5 Registers Banks.
5) The AVR core combines a rich instruction set with 32 general purpose working registers.
6) TRISA Register of PIC is used to configure port B direction as Input or Output.

Q.2 Answer the following. 16
   a) Write note on types of the RESET of PIC Microcontroller.
   b) Write any Eight Salient features of AVR.
   c) Draw LCD interfacing circuit diagram with AVR Microcontroller.
   d) Write not on Register banks of PIC Microcontroller.

Q.3 a) Explain universal asynchronous receiver and transmitter of AVR Microcontroller. 10
   b) Explain Status Register of PIC Microcontroller. 06

Q.4 a) Explain On chip ADC of PIC with suitable block diagram. 10
   b) Draw the power supply, Reset circuit and clock circuit of PIC Microcontroller. 06

Q.5 a) Draw the architecture of AVR microcontroller and explain in details. 10
   b) Write note on watchdog timer. 06

Q.6 a) Explain temperature sensor interfacing with PIC. 10
   b) Explain any two Arithmetic instructions of AVR Microcontroller. 06

Q.7 a) Explain IO ports of 16F877 in detail. 08
   b) Explain interfacing of Opto-coupler to Microcontroller with suitable diagram and program. 08

Seat No.	

M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Control Theory (MSC21201)

Day & Date: Monday, 18-12-2023　　　　　　　　　　　　　　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 for the following.　　　　　　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 element of the system that controls the process is called as _____.
   a) controller　　　　　　　b) input
   c) processor　　　　　　　d) plant

7) If a control system has one input and one output, it is termed as _____ system.
   a) a single feedback　　　b) SIMO
   c) MIMO　　　　　　　　　d) SISO

8) A parabolic function has a value of _____ for $t > 0$.
   a) $At^2/2$　　　　　　　　b) 0
   c) At^2　　　　　　　　　d) t^2

9) In first step of reduction of block diagram, _____ blocks are reduced.
   a) multiple　　　　　　　　b) parallel
   c) single　　　　　　　　　d) series

10) Positive feedback signal improves _____ of automatic control system.
   a) delay　　　　　　　　　b) performance
   c) input　　　　　　　　　d) error

   B) **Write True or False.** 06
   1) An automatic toaster system is an example of closed loop system.
   2) Feedback increases the stability of the system.
   3) Chain node of SFG has branches in both directions.
   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) Define the terms plant, input, output and disturbance in a control system.
   c) State any two properties of Signal flow graph. Justify each with an example.
   d) Define source node, sink node, chain node and forward path of SFG.

Q.3 **Answer the following.**
   a) From the following block diagram draw the corresponding signal flow graph 10 and evaluate closed loop transfer function using mason's gain formula.
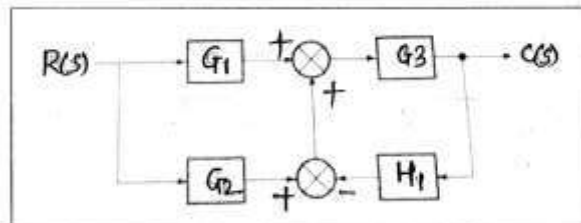
   b) Derive an expression for steady state error for step and ramp input. 06

Q.4 **Answer the following.**
   a) Describe the effect of damping factor ε on the transient response of the 10 second order system.
   b) With suitable example describe the closed loop control system. 06

Q.5 **Answer the following.**
   a) Examine the stability of control system having characteristic equation 10 $S^3 + 6S^2 + 11S + 6 = 0$ by Routh's Criterion. Give the advantages and limitations of the criterion.
   b) Write a note polar plot. 06

Q.6 **Answer the following.**
   a) Compare the Block Diagram representation and Signal flow graph. 10
   b) Write a note on Hurwitz Criterion on the stability. 06

Q.7 **Answer the following.**
   a) What is need of block diagram reduction? Explain in detail the rules used 10 for block diagram reduction.
   b) Give the advantages and features of Transfer function. 06

Seat No.	

M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Real Time Operating System (MSC21202)

Day & Date: Tuesday, 19-12-2023   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) Figure to right indicate full marks.

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

1) Which of the following is a part of RTOS kernel?
   a) memory   b) input
   c) ISR   d) register

2) Round robin scheduling falls under the category of _____.
   a) Non-preemptive scheduling
   b) Preemptive scheduling
   c) All of the mentioned
   d) None of the mentioned

3) Which command is used to sort the lines of data in a file in alphabetical order?
   a) sort   b) sort - r
   c) st   d) sh

4) In rate monotonic scheduling, a process with a shorter period is assigned _____.
   a) a higher priority   b) a lower priority
   c) higher & lower priority   d) none of the mentioned

5) Interrupt latency refers to the period of time _____
   a) from the occurrence of an event to the arrival of an interrupt
   b) from the occurrence of an event to the servicing of an interrupt
   c) from arrival of an interrupt to the start of the interrupt service routine
   d) none of the mentioned

6) The real difficulty with Shortest Job First in short term scheduling is ____.
   a) it is too good an algorithm
   b) knowing the length of the next CPU request
   c) it is too complex to understand
   d) none of the mentioned

7) Which of the following algorithms tends to minimize the process flow time?
   a) First come First served   b) Shortest Job First
   c) Earliest Deadline First   d) Longest Job First

8) With round robin scheduling algorithm in a time shared system _____.
   a) using very large time slices converts it into First come First served scheduling algorithm
   b) using very small time slices converts it into First come First served scheduling algorithm
   c) using extremely small time slices increases performance
   d) using very small time slices converts it into Shortest Job First algorithm

9) What is FIFO algorithm?
   a) first executes the job that came in last in the queue
   b) first executes the job that came in first in the queue
   c) first executes the job that needs minimal processor
   d) first executes the job that has maximum processor needs

10) In which scheduling certain amount of CPU time is allocated to each process?
   a) earliest deadline first scheduling
   b) proportional share scheduling
   c) equal share scheduling
   d) none of the mentioned

B) State true or false 06
   1) AVR ATmega8L microcontroller has 1 Kbyte Internal SRAM.
   2) Context switching is available in the Real time operating system.
   3) In rate monotonic scheduling shorter duration job has higher priority
   4) Operating system is a system software and hardware
   5) Real time systems must have preemptive kernels
   6) In a Real-time operating system, the minimize utilization of devices and systems.

Q.2 Answer the following. 16
   a) Explain Concept of embedded system
   b) Write Characteristics of Real-Time operation system
   c) Write note on Binary semaphore.
   d) What do you mean by RTLinux Kernel?

Q.3 a) Explain Concept of Sharing of resources. 08
   b) Explain Concept of Task Management. 08

Q.4 a) Write note on Race condition, Critical condition. 10
   b) Write note on Services of Scheduler. 06

Q.5 a) Write note on Inter task Communication. 08
   b) Write Simple programs on creation of task. 08

Q.6 a) Design embedded systems for Measurement temperature. 10
   b) Explain Concept of Processes and Threads. 06

Q.7 a) Write program based on Tiny RTOS kernel to toggle LED. 10
   b) Write note on Counting semaphore. 06

Seat No.

M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Opto Electronics (MSC21206)

Day & Date: Wednesday, 20-12-2023   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 Q. No. 7
3) Figure to right indicate full marks.

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

1) The numeric aperture is the fiber optic cable's ability: _____.
   a) To collect the light   b) To diffract the light
   c) To reflect the light   d) To refract the light

2) Which of the following is false for Loss in fiber _____.
   a) Impurities   b) microbending
   c) Attenuation in fiber   d) stepped index operation

3) Which of the following is true for Laser
   a) spatial coherence   b) temporal coherence
   c) both a & b d   d) none

4) In a phototransistor, the base current is:
   a) Set by a bias voltage
   b) Directly proportional to light
   c) Inversely proportional to light
   d) Square to light intensity

5) The relation between bandwidth of an optical fibre and NA is _____.
   a) $BW \alpha NW$ b) $BW \alpha 1/NA$
   c) $BW \alpha 1/(NA)^2$ d) $BW \alpha 1/(NA)^3$

6) In the first window of optical fiber, light source are generally _____.
   a) GaAIP   b) GaAlBr
   c) GaAlAs   d) GeAlAs

7) The combined package of LED and a photodiode is known as:
   a) Optocouplers   b) Opto isolator
   c) Optically coupled isolator   d) All of the above

8) Photo detectors used in optical fiber is_____.
   a) PIN, APDs   b) PIN, Guun diode
   c) APDs Gunn diode   d) none of these

9) Which pumping method is used in He-Ne laser?
   a) Optical Pumping   b) Electrical Excitation
   c) Chemical Pumping   d) Direct Conversion

10) Responsivity of a photodiode is specified as _____.
    a) amps/watts   b) watts /
    c) volt / watt   c) volts / amp

B) State True of False. 06
1) Total internal reflection can take place when light travel from diamond to glass.
2) Material dispersion of an optical fiber is vanishes if RI of core varies linearly with wavelength.
3) The source of light for optical fiber is PIN diode.
4) Graded index can be used for multimode fiber optic communication.
5) In the fabrication of optical fiber silica is used because it is obtained in abundance.
6) Glass having the highest refractive index

Q.2 Answer the following. 16
a) Draw block diagram of optical fiber communication system.
b) List various loss mechanisms in optical fiber.
c) Distinguish between LED and LASER.
d) Write a note on Acoustic optic devices.

Q.3 Answer the following. 16
a) Describe structure of cable design.
b) What is coupling? Discuss the reasons for coupling loss.

Q.4 Answer the following. 16
a) With neat diagram explain propagation of light in optical fiber.
b) Explain the structure of surface emitter LEDs using neat schematics.

Q.5 Answer the following. 16
a) What is modulation? Discuss intensity modulation with special reference to fiber optic instrumentation.
b) Discuss the working principle of PIN photo detector with physical structure, field distribution and energy diagram.

Q.6 Answer the following. 16
a) Explain the concept of absorption and emission of radiation of laser diode with suitable diagram.
b) Explain the various loss that takes place in optical fiber. Draw suitable diagrams to explain your answer.

Q.7 Answer the following. 16
a) Explain the concept of absorption and emission of radiation of laser diode with suitable diagram.
b) Explain terms:
   i) optical anostropy
   ii) Birefringence Calsite
   iii) Dichroism

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Digital Signal Processing (MSC21301)

Day & Date: Friday, 05-01-2024   Max. Marks: 80
Time: 11:00 AM To 02:00 PM

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

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

1) The approximate transition width of main lobe of a Hamming window is ___.
   a) $8\pi/M$ b) $4\pi/M$
   c) $12\pi/M$ d) $2\pi/M$

2) _____ is true regarding the number of computations required to compute DFT at any one value of 'k'.
   a) 4N-2 real multiplications and 4N real additions
   b) 4N real multiplications and 4N-4 real additions
   c) 4N-2 real multiplications and 4N+2 real additions
   d) 4N real multiplications and 4N-2 real additions

3) The ROC of a causal infinite length sequence is _____.
   a) $|z| < r_1$ b) $|z| > r_1$
   c) $r_2 < |z| < r_1$ d) None of the mentioned

4) The FT of a conjugate symmetric function is always
   a) imaginary   b) real
   c) conjugate symmetric   d) conjugate anti-symmetric

5) _____ conditions made digital signal processing more advantageous over analog signal processing.
   a) Flexibility   b) Accuracy
   c) All of the mentioned   d) All of the mentioned

6) The process of 'aliasing' is _____.
   a) Peaks overlapping   b) Phase overlapping
   c) Amplitude overlapping   d) Spectral overlapping

7) If $W_4^{100} = W_x^{200}$, then what is the value of x is _____.
   a) 2   b) 4
   c) 8   d) 16

8) The time period of the signal $x(t) = \cos 2\Pi t + \sin 5\Pi t$ is _____.
   a) 2.5sec   b) 5sec
   c) 10sec   d) 2sec

9) The Nth root of unity W_N is given as _____.
   a) $e^{j2\pi N}$ b) $e^{-j2\pi N}$
   c) $e^{-j2\pi/N}$ d) $e^{j2\pi/N}$

10) The values of z for which the value of $X(z) = \infty$ are _____.
   a) Poles   b) Zeros
   c) Solutions   d) None of the mentioned

B) **State true or false.** 06
1) Differentiating is done to convert a continuous time signal into discrete time signal.
2) The width of the main lobe of the frequency response of a rectangular window of length $M - 1$ is $4\pi/M$.
3) The z-transform of a sequence $x(n)$ wich is given as $X(z) = \sum^{\infty} n = -\infty$ $x(n)z^{-n}$ is known as uni-lateral Z-transform.
4) For the computation of linear convolution tabulation method is used.
5) For flow diagram of DITFFT for $N = 16$ total number of stages are four.
6) The z-transform $X(z)$ of the signal $x(n) = a^n u(n)$ has one pole at $z = a$ and one zero at $z = 0$.

Q.2 **Answer the following.** 16
a) Write a note on Auto-correlation.
b) Explain the relationship between FT and ZT.
c) Write a note on FIR filter design.
d) Explain circular convolution using matrix method.

Q.3 a) Define Fourier transform of aperiodic signal. 08
b) If input $x(n) = \{2,2,4\}$ and impulse response $h(n) = \{1,1\}$ find the output of 08
system using FFT and IFFT.

Q.4 a) Two Sequences of length 4 are: 10
$x(n) = \{0,1,2,3\}$ and $h(n) = \{2,1,1,2\}$ find the circular convolution using graphical method.
b) Find the Z-transform of finite duration sequence $x(n) = \{1,2,4,5,0,7\}$ comment 06
on its ROC.

Q.5 a) Find the inverse Fourier transform of $\delta(\Omega)$ and $\delta(\Omega - \Omega_0)$ using the result find 08
the FT of $x(t) = 1$ or DC signal.
b) Explain cyclic property of twiddle factor. 08

Q.6 a) Determine the ZT of $x(n) = sin\omega_0 n\, u(n)$ along with ROC. 08
b) Explain the design of FIR filter using rectangular window. 08

Q.7 a) Explain symmetry property of DFT. 10
b) Determine the ZT and sketch the ROC of 06
$x(n) = (1/3)^n\ where\ n > 0$
$\quad (1/2)^{-n}\ for\ n < 0$

Seat No.

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Advanced Digital Design with VHDL (MSC21302)

Day & Date: Sunday, 07-01-2024   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. No. 3 to Q. No. 7
         3) Figure to right indicate full marks.

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

1) The VHDL is utilized for _____design.
    a) analog   b) digital
    c) both a & b   d) none of these

2) The package std_logic_1164 is accessed by _____ clause.
    a) library   b) use
    c) type   d) both a & b

3) The _____ value is assigned by <= assignment operator.
    a) signal   b) variable
    c) constant   d) all of these

4) The exit and next statements are used only _____ loop statement.
    a) outside   b) inside
    c) both a & b   d) none of these

5) The PLD devices are utilized for _____ circuit design.
    a) analog   b) digital
    c) analog + digital   d) digital + analog

6) The _____ design process is included in front end design.
    a) Design entry   b) gate level netlist
    c) both a & b   d) none of these

7) The CPLD is based on _____ architecture.
    a) sum-of-product   b) product-of-sum
    c) both a & b   d) logic block

8) The component declaration declares the _____ of the component.
    a) name   b) interface
    c) both a & b   d) none of these

9) The FPGA architecture is based on _____ to generate logic functions.
    a) LUT   b) multiplexer
    c) macrocell   d) both a & b

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

B) **State true or false.** 06
1) The '&' operator is addition operator used in VHDL code.
2) The operator NAND and NOR are associative.
3) The HDL is one of the ways of design entry in the CAD process.
4) In architecture for an entity, all statements are concurrent.
5) The component declaration is appeared in the declaration part of entity.
6) The wait statement is a concurrent statement.

Q.2 **Answer the following.** 16
a) Explain the advantages of VHDL.
b) Explain the architecture of FPGA.
c) Discuss the EDA tools.
d) Explain the entity using half adder.

Q.3 **Answer the following.**
a) State and explain the various types of architecture bodies for VHDL with 10 suitable example.
b) Write VHDL code for 8-bit input comparator. 06

Q.4 **Answer the following.**
a) Explain the Attributes and Generic in VHDL with suitable example. 10
b) Write VHDL code for 8:1 demux using behavioral modelling. 06

Q.5 **Answer the following.**
a) Explain the LOOP statement in detail with suitable example. 10
b) Write VHDL code for serial in serial out shift register. 06

Q.6 **Answer the following.**
a) State and explain the various language element of VHDL. Explain the 10 Identifier and data objects in detail.
b) Write VHDL code for 3:8 decoder. 06

Q.7 **Answer the following.**
a) Explain the IF statement in detail with suitable example. 10
b) Write VHDL code for one digit counter. 06

M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS
ARM Microcontroller and System Design (MSC21306)

Day & Date: Tuesday, 09-01-2024   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. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

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

1) _____ are the power saving techniques for ARM CPU's.
    a) RISC
    b) ISA optimization
    c) Application-specific components
    d) All of the mentioned

2) _____ Instruction is basically used to check the branch enable bit.
    a) BEQ   b) ASSIGN
    c) PSLOAD   d) ADR

3) Timer in the board has _____ compare and _____ capture channels.
    a) 3 and 4   b) 4 and 3
    c) 4 and 4   d) 3 and 3

4) The clock speed of ARM7TDMI is around _____.
    a) 10-20 MHz   b) 20-30 MHz
    c) 50-60 MHz   d) 80-100 MHz

5) ARM microcontroller has _____ 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) When the processor is executing in jazelle state, then all instructions
    are _____ wide
    a) 16 bit   b) 8 bit
    c) 32 bit   d) 64 bit

8) UART is similar to _____.
    a) SPI protocol   b) 12C protocol
    c) HTTP protocol   d) MQTT protocol

9) In ARM, PC is implemented using _____.
    a) Caches   b) Special function register
    c) General purpose register   d) Stack

10) _____ Processor used by ARM Cortex M3.
   a) 8-bit CISC   b) 8-bit RISC
   c) 32-bit CISC   d) 32-bit RISC

B) State true or false   **06**
   1) LPC2141 system provides real time debugging with the on chip real
      monitor software.
   2) The duplicate registers are used in situations of extential switching.
   3) SPI have a single master.
   4) Pull up registers are required in I2C.
   5) ARM7TDMI controller is 64bit
   6) Timer in the board has 4 compare and 4 capture channels.

Q.2 Answer the following   **16**
   a) What are the features of ARM processor?
   b) Write a note on CPSR.
   c) Explain the software interrupt instruction.
   d) Write a note on barrel shifter.

Q.3 Answer the following
   a) Explain the architecture of LPC2148 and its features.   **10**
   b) Explain the bus technology and describe the AMBA bus architecture of **06**
         ARM processor.

Q.4 Answer the following
   a) Explain the Thumb instruction set architecture.   **10**
   b) Explain the pin-out structure of LPC2148.   **06**

Q.5 Answer the following
   a) Explain the timers and counters of LPC2148. What are the features of **08**
         LPC2148?
   b) Write a note on interrupt controller and give the features on ADC of **08**
         LPC2148.

Q.6 Answer the following
   a) Explain the PLL0 and PLL1 of LPC2148.   **08**
   b) What is pipelining? Explain concept of pipelining of ARM processor.   **08**

Q.7 Answer the following
   a) Draw the block diagram of ARM processor core and explain each block in **10**
         detail.
   b) What are the types of CORTEX-M series? Explain types of cortex series in **06**
         detail.

Seat No.

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Microwave Devices, Antennas and Measurements (MSC21401)

Day & Date: Monday, 18-12-2023　　　　　　　　　　　　　Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question 1 and 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) 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) Which 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 or 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
   a) Write a note on Transmission coefficient.
   b) Explain Circulators and Isolators.
   c) Write a note on InP diode.
   d) 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 10
   $R = 2\Omega m, G = 0.5 \text{ m}\mho/m, F = 1\text{GHz}, L = 8\text{nH}/m, C = 0.23\text{pF}$ calculate.
   i) Characteristics impedance
   ii) 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-2023
ELECTRONICS
Networking and Data Communications (MSC21402)

Day & Date: Tuesday, 19-12-2023   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) E-mail address is a _____ address.
   a) specific   b) logical
   c) port   d) physical

2) FDM uses _____ to prevent signal overlapping.
   a) Band pass Filter   b) Guard band
   c) Amplifier   d) Low pass filter

3) OSI model has _____ layers.
   a) 4   b) 5
   c) 6   d) 7

4) _____ is an internet service.
   a) Bluetooth   b) SONET
   c) E-mail   d) Piconet

5) A port address in TCP/IP is of _____ bits.
   a) 8   b) 16
   c) 10   d) 20

6) _____ is the pattern for the flag field of an HDLC frame.
   a) 11111111   b) 01010101
   c) 10101010   d) 01111110

7) _____ of the following is not a type of topology.
   a) OSI   b) Bus
   c) Ring   d) Mesh

8) _____ messages is not a service provided by user agent in e-mail service.
   a) Replying to   b) Forwarding
   c) Deleting   d) Composing

9) _____ layer of SONET is responsible for movement of signal from its optical source to optical destination.
   a) Line   b) Path
   c) Section   d) Photonic

10) _____ layer of the OSI model is responsible for framing of the data.
   a) Physical   b) Presentation
   c) Network   d) Data link

B) **State true or false** 06
1) The physical layer of OSI divides stream of bits into frames.
2) Packet switched network does not provide resource reservation.
3) Bipolar AMI uses alteration in positive and negative voltages to represent binary 1.
4) Ethernet address provided by NIC to a station is of 8-byte.
5) Message authentication is one of the security services.
6) IEEE defines BSS as building block of wireless LAN.

Q.2 **Answer the following** 16
a) What is data communication? Define its components.
b) Write a short note on IPv6 addressing.
c) Explain the concept of message confidentiality in network security services.
d) Draw the digital signal to represent data pattern 01001110 using NRZ-L and NRZ-I coding schemes.

Q.3 **Answer the following**
a) Explain the OSI model in detail. 10
b) Explain the operation of datagram network. 06

Q.4 **Answer the following**
a) Describe the modulation technique used in Digital Subscriber line. 08
b) Write a note on IPv4 protocol suit. 08

Q.5 **Answer the following**
a) Describe the E-mail service. 10
b) What is multiplexing in data communication? Explain any two types. 06

Q.6 **Answer the following**
a) Describe the framing at the data link layer. 08
b) Explain the architecture of Bluetooth Wireless LAN technology. 08

Q.7 **Answer the following**
a) Explain layers of SONET. 10
b) Write a note on standard Ethernet. 06

Seat No.	

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Nanoelectronics (MSC21403)

Day & Date: Wednesday, 20-12-2023   Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question no. 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.
               4) Answer five questions.

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

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

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

3) The motion of particle in the nanoworld is determined by _____
    a) wave and quantum mechanics
    b) wave and classical mechanics
    c) wave
    d) quantum and classical mechanics

4) The _____ is used to decrease the electron gas dimensionality.
    a) resonant tunneling effect   b) split gate technique
    c) hot electron transistor   d) resonant tunneling transistor

5) The OLED's are an electroluminescent organic material between two _____ of different work functions.
    a) conductors   b) nonconductors
    c) insulator   d) semiconductors

6) The triangular well is effectively _____ DES system.
    a) zero   b) two
    c) one   d) three

7) The immersion lithography is currently considered for _____ chip.
    a) 32 nm   b) 193 nm
    c) 134 nm   d) 90 nm

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

9) 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

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

B) State True or False.   **06**
1) If characteristics $\lambda \geq L_x$ and $L_x \ll L_z, L_y$ then it stands for quantum well.
2) The zero DEG structure is often called as artificial atoms.
3) The organic semiconductor has Van-der-wall bonds.
4) The homo-structures are made from the same material with non-uniform doping.
5) A super-lattice consists of a periodic set of MQW wherein the thickness of energy barriers separating the each wells is sufficiently small.
6) The particle moves throughout the structure without scattering is called diffusive regime of particle.

Q.2 Answer the following.   **16**
   a) Explain the modulation doped quantum wells.
   b) Discuss in brief nanotechnology and nanoelectronics.
   c) Write a note on characteristics length in nanostructures.
   d) Explain the finite potential square well.

Q.3 Answer the following.
   a) Explain the concept of superlattice and discuss the Kronig-Penney model of superlattice.   **10**
   b) Explain the quantum well, wire and dots in brief considering the lengths. **06**

Q.4 Answer the following.
   a) What do you mean by MOSFET structures?   **10**
   b) Write on nanoimprint lithography.   **06**

Q.5 Answer the following.
   a) Explain the parabolic and triangular quantum well.   **10**
   b) Write a note on Coulomb Blockade.   **06**

Q.6 Answer the following.
   a) Explain the Resonant tunnelling effect and discuss the three terminal Resonant tunnelling devices.   **10**
   b) Write a note on OLED.   **06**

Q.7 Answer the following.
   a) Explain in detail tunnelling effect and tunnelling elements.   **10**
   b) Write a note on quantum dots.   **06**

Seat No.	

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS
Mechatronics and Industrial Automation (MSC21406)

Day & Date: Thursday, 21-12-2023   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) The mechatronic design process consists of _____ phases.
   a) One   b) Three
   c) Two   d) Four

2) What is the difference between SCADA and HMI?
   a) Both are same
   b) HMI is not related with SCADA
   c) HMI can be a part of SCADA but SCADA can't be a part of HMI
   d) SCADA is a part of HMI

3) A PLC consists of _____.
   a) Processor Unit   b) Program Memory
   c) Input/output Section   d) All of the above

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

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

6) An NOR function implemented in ladder logic uses _____.
   a) Normally-closed contacts in series
   b) Normally-open contacts in series
   c) A single normally-closed contact
   d) Normally-open contacts in parallel

7) The _____ is the process of representing the behavior of a real system by a collection of mathematical equations and logic.
   a) Simulation   b) Modeling
   c) Control   d) Protocol

8) 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

9) 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

10) 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

B) State true /false.   **06**
   1) The graphic display of the whole plant provides a graphical and logical representation of the process.
   2) For PLC programming PICPGM is used.
   3) Normally open contacts are open when Input is not energized.
   4) A open system is a collection of components that is designed to drive a given system with a given input to a desired output.
   5) Actuators produces motion or cause some action.
   6) All block diagram languages consist of two fundamental objects: signal wires and blocks.

Q.2 Answer the following questions.   **16**
   a) Write note on Serial Communication of PLC.
   b) Explain the architecture of RTU with suitable diagram.
   c) Write a note on registers.
   d) What do you mean by industrial automation.

Q.3 Answer the following
   a) Draw Ladder diagram program to ON-OFF the out device and its equivalent   **10**
   circuit diagram.
   b) Write note on Profibus and its types.   **06**

Q.4 Answer the following
   a) Write Timer function of PLC in detail with suitable example.   **10**
   b) What do you mean by design Process of mechatronics.   **06**

Q.5 Answer the following.
   a) Write note on DCS communication.   **08**
   b) Explain in detail architecture of DCS.   **08**

Q.6 Answer the following.
   a) What is SCADA? Explain types of SCADA in details.   **10**
   b) Write not on system modeling.   **06**

Q.7 Answer the following.
   a) Explain the PLC architecture in detail.   **10**
   b) List the advantages and disadvantages of mechatronics systems.   **06**