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Set P

M.Sc. (Electronics) (Sem - I) (New) (NEP CBCS) Examination: March/April - 2025
Advanced Microcontroller (2313101)

Day & Date: Thursday, 15-May-2025 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

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

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

1) In PIC16F877 ____ instruction is used to return from a subroutine.
a) RETLW b) RETURN
c) RETFIE d) GOTO

2) In ATmega8L to perform a bitwise AND operation in AVR _____ instruction is used.
a) OR b) XOR
c) AND d) ADD

3) ____ instruction is used to subtract WREG from a file register in PIC16F877.
a) SUBWF b) ADDWF
c) DECFSZ d) INCFSZ

4) In AVR ATmega8L ____ general-purpose registers are available.
a) 16 b) 24
c) 32 d) 64

5) The resolution of the ADC in ATmega8L is ____.
a) 8-bit b) 10-bit
c) 12-bit d) 16-bit

6) ____ instruction set does AVR ATmega8L use.
a) Complex Instruction Set Computer (CISC)
b) Reduced Instruction Set Computer (RISC)
c) Very Long Instruction Word (VLIW)
d) Micro coded Instruction Set

7) ____ port is used as the analog input in PIC16F877.
a) PORTA b) PORTB
c) PORTC d) PORTD

8) The PIC16F877 package have ____ pins.
a) 28 b) 40
c) 44 d) 20

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

1) ATmega8L supports a total of 3 external interrupts.
2) In the PIC16F877, the WDT (Watchdog Timer) is disabled by default.
3) AVR ATmega8L has an internal EEPROM with a size of 512 bytes.
4) The maximum operating clock frequency of the PIC16F877 is 40 MHz.

Q.2 Answer the following. (Any Six) **12**

a) Write any four features of PIC microcontroller.
b) List the different types of Temperature sensors.
c) Write note on watchdog timer of AVR microcontroller.
d) List the Steps of AVR Studio programming.
e) Write note on Status register of PIC microcontroller.
f) Compare AVR and PIC microcontroller.
g) Write note on Flash program memory of AVR microcontroller.
h) Draw the Opto-coupler interfacing diagram with AVR.

Q.3 Answer the following. (Any Three) **12**

a) Write note on PWM technique.
b) Draw the Reset and clock circuits of PIC microcontroller.
c) Write note on Arithmetic instruction set of AVR microcontroller.
d) List the Steps of Micro C the IDE for embedded C programming.

Q.4 Answer the following. (Any Two) **12**

a) Explain Addressing modes in Instruction set of PIC microcontroller.
b) Explain On chip ADC of AVR microcontroller.
c) Write note on universal asynchronous receiver and transmitter of AVR.

Q.5 Answer the following. (Any Two) **12**

a) Explain Architecture of 16F877.
b) Write a program to blink the LED array connected at port B.
c) Explain pH Measurement embedded system using AVR in details.

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M.Sc. (Electronics) (Sem - I) (New) (NEP CBCS) Examination: March/April - 2025
Industrial Power Electronics (2313102)

Day & Date: Saturday, 17-May-2025 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) In AC voltage controller if the SCRs are switched on for 25 cycles and off for 75 cycles then the duty cycle would be ____.
a) 4.0 b) 0.20
c) 3.0 d) 0.25

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

3) In EAC technique the average output voltage is controlled by varying_____
a) conduction angle b) extinction angle
c) firing angle d) All of these

4) McMurray - Bedford inverter uses ____ technique of commutation.
a) voltage commutation b) current commutation
c) class B d) class A

5) In PWM technique the output voltage is controlled by changing the
a) firing angle b) width of pulses
c) extinction angle d) All of these

6) For unidirectional AC voltage controller if α varies from o to π the V_{rms} varies from ____.
a) Vs to Vs/$\sqrt{2}$ b) Vs to Vs/2
c) Vs to$\sqrt{2}$. Vs d) None of these

7) In cycloconverter output is controlled by controlling the _____ of the thyristors.
a) conduction angle b) Phase
c) Width d) delay angle

8) In choppers, for chopping period T , the output voltage can be controlled by varying ____.

a) T keeping Ton constant b) Toff keeping T constant
c) Ton keeping T constant d) all of these

B) True or false: **04**

a) In constant frequency system of TRC technique for choppers the output load voltage V_{Lav} can be varied by varying frequency f with t_{on} constant.
b) Cycloconverters provide output with fixed frequency.
c) Thyristors of AC voltage controllers need no extra commutation circuitry.
d) Single phase half bridge inverter provides square wave output.

Q.2 Answer the following (Any Six). **12**

a) Give the applications of rectifiers.
b) What do you mean by the harmonics in the cycloconverter circuit? Mention the methods used for its reduction.
c) Discuss the role of free wheeling diode in rectifiers.
d) What are the choppers? Classify them.
e) Give the applications of inverter.
f) Draw the diagram of class B Chopper.
g) Enlist the advantages of cyclonverters.
h) Bidirectional controllers must provide firing angle greater than pf angle.Justify.

Q.3 Answer the following (Any Three). **12**

a) Compare between AC voltage controllers and cycloconverters.
b) Describe the working of single-phase unidirectional controllers with $R-L$ load.
c) Explain the operation of SAC technique.
d) Draw a neat labeled diagram for three phases to single phase cycloconverter.

Q.4 Answer the following (Any Two). **12**

a) With neat diagram describe the working of single-phase dual converter.
b) Discuss the working of step up cycloconverter.
c) Describe the working of single-phase bridge inverter.

Q.5 Answer the following (Any Two). **12**

a) Explain the detailed operation of Mc-Murray full bridge inverter.
b) Describe the operation of single phase half wave controllers.
c) Describe the operation of three phase dual converter.

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Set P

M.Sc. (Electronics) (Sem - I) (New) (NEP CBCS) Examination: March/April - 2025
Numerical Methods (2313108)

Day & Date: Monday, 19-May-2025 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) Absolute error (e_a) =
a) |Actual value - approximate value|100
b) |True value - approximate value| / True value
c) Absolute error / |true value|
d) None of the mentioned

2) 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

3) LU Decomposition method is also known as ____
a) Tangularization method b) LU Factorization method
c) both a) and b) d) none of the mentioned

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

5) The LU method of factorization was introduced by the mathematician ____
a) Alan Tango b) David Hilbert
c) G. W. Leibniz d) Alex Grothendieck

6) If $f(t) = t\sin(at)$ then its Laplace Transform $f(t)$ is ____.
a) $\sqrt{\pi}/2\sqrt{s}$ b) $a/s^2 + a^2$
c) Indeterminate d) $2as/(s^2 + a^2)^2$

7) 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

8) The voltage across the LC combination in a series RLC circuit is ____

a) 0 b) 1

c) 2 d) 3

B) State true or false: **04**

a) The coefficients of the equation obtained during the elimination called Pivots.

b) The Laplace transform of impulse function is 1/s.

c) $B^{-1}AX = A^{-1}B$ the solution of system of equation in form of AX = B

d) Unit of inductance is Henry.

Q.2 Answer the following (Any Six). **12**

a) Write a note on curve fitting.

b) Compute the value of the $I = \int_0^1 e^{-x}\, dx$ by using trapezoidal rule.

c) What is backward substitution method?

d) Write cubic spline interpolation formula.

e) What is Euler's method?

f) What is Inverse Laplace transform?

g) Define matrix. Write types of matrices.

h) What are the different types of RK method?

Q.3 Answer the following (Any Three) **12**

a) Find out the tridiagonal matrix for R-2R ladder network in numerical analysis.

b) Write a note on Eigen values and vector.

c) Prove that $L\{f'''(t)\} = s^3 f(s) - s^2 f(0) - sf'(0) - f''(0)$

d) Explain Runge Kutta method.

Q.4 Answer the following (Any Two) **12**

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

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

b) Explain Taylor's series method.

c) Fit a curve of the form $y = \frac{x}{ax+b}$ for the data given below by the method of least square.

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

Q.5 Answer the following (Any Two). **12**

a) Using the least square fitting process fit the following data to straight line.

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

b) Solve the system of equations using Gauss elimination method

a) $2x_1 + x_2 + x_3 = 10$

b) $3x_1 + 2x_2 + 3x_3 = 18$

c) $x_1 + 4x_2 + 9x_3 = 16$

c) Explain Absolute error and Relative error and calculate absolute and relative errors, comment on the result.

i) True value = 1×10^{-6}, approximate value = 0.5×10^{-6}

ii) True value = 1×10^{6}, approximate value = 0.99×10^{6}

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Set **P**

M.Sc. (Electronics) (Sem - I) (New) (NEP CBCS) Examination: March/April - 2025
Research Methodology (2313103)

Day & Date: Saturday, 24-May-2025 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) A research design must contains _____.
a) a clear statement of the research problem
b) procedures and techniques to be used for gathering information
c) the population to be studied
d) all of the mentioned

2) _____ is called non-probability sampling.
a) Cluster sampling b) Quota sampling
c) Systematic sampling d) Stratified random sampling

3) Bibliography given in a research report _____.
a) helps those interested in further research
b) shows vast knowledge of the researcher
c) has no relevance to research
d) all the above

4) Action-research is _____.
a) An applied research
b) A research carried out to solve immediate problems
c) A longitudinal research
d) All the above

5) _____ does not correspond to characteristics of research.
a) Research is not passive
b) Research is systematic
c) Research is not a problem-oriented
d) Research is not a process

6) Formulation of hypothesis may not be required in _____.
a) Survey method b) Historical studies
c) Experimental studies d) Normative studies

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

8) A conceptual framework can be understood as a _____ that you require before research.
a) Research hypothesis b) Synopsis of Research
c) Research paradigm d) Research design

B) State true or false **04**

1) A research problem is not feasible only when it consists of independent and dependent variables.
2) Survey is not the method of Research.
3) A null hypothesis is when there is difference between the variables.
4) When a research problem is related to heterogeneous population, the most suitable sampling method is Stratified Sampling.

Q.2 Answer the following. (Any Six) **12**

a) State 7 C's of effective research writing.
b) Define research design.
c) What are data analysis techniques?
d) State the tools in applied research.
e) What is referencing style?
f) What is measurement? What are the techniques of measurement?
g) What is hypothesis? Draw its flow diagram.
h) How to Achieve Clarity in Research?

Q.3 Answer the following. (Any Three) **12**

a) Explain characteristics of an ideal research report.
b) Distinguish between Analysis & Interpretation.
c) Write a note on literature survey and review.
d) Explain descriptive vs. analytical research.

Q.4 Answer the following. (Any Two) **12**

a) Explain methods of Research design in case of exploratory research studies.
b) Write a note on Bar charts and Pie charts.
c) Explain Contents of the Research Report.

Q.5 Answer the following. (Any Two) **12**

a) Write a note on deductive and inductive approach.
b) Explain research process with flow diagram.
c) Explain features of good design.

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M.Sc. (Electronics) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Modern Control Theory (2313201)

Day & Date: Wednesday, 14-May-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

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

1) Regenerative feedback implies feedback with _____.
a) oscillations b) step input
c) negative sign d) positive sign

2) Any externally introduced signal affecting the controlled output is called a _____.
a) feedback b) stimulus
c) signal d) gain control

3) A control system working under unknown random actions is called _____.
a) computer control system b) digital data system
c) stochastic control system d) adaptive control system

4) Which of the following should be done to make an unstable system stable?
a) The gain of the system should be decreased
b) The gain of the system should be increased
c) The number of poles to the loop transfer function should be increased
d) The number of zeros to the loop transfer function should be increased

5) In an open loop control system _____.
a) Output is independent of control input
b) Output is dependent on control input
c) Only system parameters have effect on the control output
d) None of the above

6) Zero initial condition for a system means _____.
a) input reference signal is zero
b) zero stored energy
c) no initial movement of moving parts
d) system is at rest and no energy is stored in any of its components

7) An automatic toaster is a _____ loop control system.
a) open b) closed
c) partially closed d) any of the above

8) A control system in which the control action is somehow dependent on the output is known as _____.
a) Closed loop system b) Semi closed loop system
c) Open system d) None of the above

B) State True or False. **04**

1) In frequency domain analysis, the frequency of input signal should vary from 0 to ∞
2) If damping factor $\xi = 1$, then the roots are imaginary and complex conjugate.
3) If two gain blocks G1 and G2 are in series then for block diagram reduction, it is replaced by a block of gain G1G2.
4) Nyquist polar plots are not suitable to express the stability of the system.

Q.2 Answer the following question (Any Six) **12**

a) Define Steady state error.
b) Write note on signal flow graphs.
c) Define PID system.
d) Write a note on Process control system.
e) List characteristics of PI system.
f) Define Bode plots.
g) Explain the concept of stability.
h) Define poles and zeros.

Q.3 Answer the following question (Any Three) **12**

a) Compare the open loop and closed loop system.
b) Write note on Root contours.
c) Write note on PD Control system.
d) State any two properties of Signal flow graph. Justify each with an example.

Q.4 Answer the following question (Any Two) **12**

a) Explain Polar plots with suitable example.
b) Explain Routh stability criterion.
c) Compare the Block Diagram representation and Signal flow graph.

Q.5 Answer the following question (Any Two) **12**

a) Explain Nyquist stability criteria.
b) Explain construction of root loci.
c) Explain Effect of adding zero to the system.

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Set **P**

M.Sc. (Electronics) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Real Time Operating System (2313202)

Day & Date: Friday, 16-May-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

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

1) A mutex _____.
   a) Is a binary mutex
   b) Must be accessed from only one process
   c) Can be accessed from multiple processes
   d) None of these

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 of the following is a part of RTOS kernel?
   a) Memory b) Input
   c) ISR d) Register

4) The API stands for _____.
   a) Application Programming Interface
   b) Application Process Interface
   c) Application Programming Interchange
   d) None of these

5) Mailbox is a kernel object used for _____ communication.
   a) Serial b) Intertask
   c) Parallel d) Full duplex

6) The two kinds of semaphores are _____.
   a) mutex & counting b) binary & counting
   c) counting & decimal d) decimal & binary

7) A task is said to be in _____ state, if it is waiting for another event.
   a) Running b) Waiting
   c) Ready to Run d) None of these

8) 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

B) State True or False. **04**

1) Real time systems must have preemptive kernels.
2) Time duration required for scheduling dispatcher to stop one process and start another is known as process latency.
3) Event register is a Kernel object to indicate the occurrence of an event to a task.
4) Operating system is a system software and hardware.

Q.2 Answer the following. (Any Six) **12**

a) What do you mean by RTLinux Kernel?
b) Write Characteristics of Real-Time operation system.
c) Draw AVR ATmega8L microcontroller based embedded systems for Measurement of temperature.
d) State application of embedded system.
e) Define Real Time operating System (RTOS).
f) Compare Hard and Soft Real Time Systems.
g) Draw Clock circuit of AVR ATmega 8L.
h) Define tasks and task states.

Q.3 Answer the following. (Any Three) **12**

a) Write note on Counting semaphore.
b) Discuss RTLinux Kernel in detail.
c) Explain in detail characteristics of embedded system.
d) Write a note on task and task structure.

Q.4 Answer the following. (Any Two) **12**

a) Write Simple programs based on RTOS for LED interfacing.
b) Write note on RTOS Kernel object; Messages.
c) Explain the minimum component requirement of embedded system Design.

Q.5 Answer the following. (Any Two) **12**

a) Design AVR ATmega8L microcontroller based embedded system for Measurement of Humidity.
b) Explain in detail round robin and FIFO scheduling.
c) Write note on Concept of mutex.

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Set P

M.Sc. (Electronics) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Signals and Systems (2313207)

Day & Date: Tuesday, 20 May 2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

Q.1 A) Choose correct alternative. 08

1) In the time scaling operation the downscaling signal is also known as _____.
a) amplification of the signal
b) attenuation of the signal
c) compression of the signal
d) expansion of the signal

2) The I/O characteristics of _____ system are independent of the time shifting.
a) Time invariant b) Time variant
c) linear d) non-linear

3) _____ is the convolution of a signal with an impulse.
a) A new signal b) Signal itself
c) Impulse d) Signal multiplied by impulse

4) The type of systems which are characterized by input and the output quantized at certain levels are called as _____ systems.
a) Analog b) Digital
c) Continuous d) Discrete

5) Index of an array in MATLAB start with _____.
a) 0 b) 1
c) Depends on the class of array d) Unknown

6) _____ is not associated with the computation process of linear convolution.
a) Folding Operation b) Shifting Operation
c) Multiplication Operation d) Integration Operation

7) The impulse response of discrete-time signal is given by h [n] = u [n+3] The system is _____.
a) Causal b) Non-causal
c) Insufficient information d) The system cannot be classified

8) For an LTI discrete system to be stable, the square sum of the impulse response should be _____.
   a) Integral multiple of 2pi
   b) Infinity
   c) Finite
   d) Zero

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

1) The range of frequency spectrum for DTFS is $-\pi$ to $+\pi$.
2) For existence of Fourier series, the function x(t) have infinite number of discontinuities.
3) The condition of periodicity for a continuous time signal is $x(t) = x(t + T_0)$
4) The function y[n] = x [n-1] - x [n-4] is memory less.

Q.2 Answer the following (Any Six) **12**

a) What are the applications of MATLAB?
b) What is signal processing?
c) Explain unit step function.
d) Write the statement for the linearity property of the system.
e) Distinguish between continuous time and discrete time signal.
f) What is window?
g) Write operations of the systems.
h) Write a note on deterministic and random signal.

Q.3 Answer the following. (Any Three) 12

a) Determine y(n)=cos x(n), system is linear or not.
b) To represent Fourier series justify the functions with half-wave symmetry have only odd harmonics.
c) Write a note on MATLAB windows
d) Sketch a DT signal $x(n)=2^{-n}$ for -2 <n< 2 obtain $y_2(n)= x(n).u(2-n)$

Q.4 Answer the following. (Any Two)

a) Define a Signal. Explain the different methods to represent a DT signals. **12**
b) Explain tabulation method of linear convolution. Compute the convolution y(n)=x(n)*h(n) where

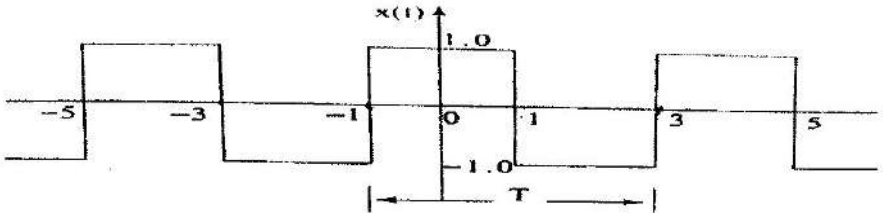
x(n)= {1,1,0,**1**,1} and h(n)={1,-2,**-3**,4} using tabulation method.
↑ ↑

c) State and prove linear convolution sum.

Q.5 Answer the following. (Any Two) **12**

a) Explain folding and advance operations of the signals.
b) Prove and explain graphically the difference between relations $x(n)*\delta(n-n_0)=x(n-n_0)$

c) Find the trigonometric Fourier series for the periodic signal x(t) is shown in figure.



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M.Sc. (Electronics) (Sem - III) (New) (NEP CBCS) Examination: March/April - 2025
Digital Signal Processing (23131301)

Day & Date: Thursday, 15-May-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

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

1) The example of one-dimensional signal is ____
a) Ac power supply signal
b) Speech signal
c) Variation of room temperature
d) All of the mentioned

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

3) Final value theorem is used for ____.
a) All type of systems b) Stable systems
c) Unstable systems d) marginally stable systems

4) The DFT of delayed unit impulse $\delta\ (n - \ n0)$ is ____.
a) $e^{-j^2\pi ikn\ 0/N}$ b) $e^{j^2\pi ikn\ 0/N}$
c) $e^{j\pi ikn\ 0/N}$ d) $e^{-j\pi ikn\ 0/N}$

5) If x(t) is odd then X(jω) ____.
a) Imaginary & even b) Imaginary & odd
c) Real & odd d) Real & even

6) In order to convert a continuous-time signal to a discrete-time signal ____ should be done.
a) Sampling b) Differentiating
c) Integrating d) None of the mentioned

7) In bilinear transformation, the left-half s-plane is mapped to ____ statement in the z-domain.
a) Entirely outside the unit circle |z|=1
b) Partially outside the unit circle |z|=1
c) Partially inside the unit circle |z|=1
d) Entirely inside the unit circle |z|=1

8) ____ method is used for Implementing a FIR system.
a) Direct form
b) Cascade form
c) Lattice structure
d) None of the mentioned

B) State True or False. **04**

1) The FT of real valued time signal has no symmetry.
2) The multiplication of two DFTs is equivalent to the circular convolution of their sequences in time domain.
3) FIR filters are recursive and they adopt any feedback.
4) Interpolation has to be performed in sampling rate conversion by rational factor.

Q.2 Answer the following (Any Six). **12**

a) Define of Bilinear transformation filter.
b) What is mean by sampling? State the sampling theorem.
c) Define Kaiser Window.
d) What are the applications of digital signal processing?
e) State final value theorem.
f) What is z transform? List the Properties of z transform.
g) Define Nyquist rate.
h) Explain existence of FT.

Q.3 Answer the following (Any Three). **12**

a) Obtain IZT using residue method from $X(Z)= Z(Z+1)/(Z-1)^2$
b) Find the Fourier transform of complex and real functions.
c) Define and prove ZT of unit ramp function and comment on its ROC.
d) Write a note on PFE method.

Q.4 Answer the following (Any Two). **12**

a) Find the FT of
i) sgn(t)
ii) u(t)
b) State and Prove linearity property of DFT.
c) An analog filter has the transfer function H(s)= 1/s+1 using BLT technique determine the transfer function of digital filter H(Z) and also write the difference equation of digital filter.

Q.5 Answer the following (Any Two). **12**

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

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

c) State unilateral Z-transform. Prove shifting property of unilateral ZT using time advance function.

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Set P

M.Sc. (Electronics) (Sem - III) (New) (NEP CBCS) Examination: March/April - 2025
ARM Microcontroller and System Design (23131303)

Day & Date: Saturday, 17-May-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

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

1) In LPC 2148 PLL setting time is_____
a) 100 μs b) 50 μs
c) 20 μs d) 10 μs

2) In LPC 2148, ADC0 has ____channels.
a) 3 b) 6
c) 7 d) 8

3) To increase the code density ARM uses____
a) 64 bit instruction set b) Jazzale 32-bit instruction set
c) Thumb 16 bit instruction set d) None of these

4) In LPC 2148, when internal reset is removed the processor begins executing at____
a) Address 0 b) Address 1
c) Address 5 d) Address 7

5) The Cache is placed between ____.
a) Flash memory and registers b) main memory and core
c) Peripherals d) none of these

6) In LPC 2148 on chip static RAM is ____.
a) 1-8KB b) 1-16KB
c) 4-20KB d) 8-40KB

7) ____ instructions use the ALU to generate an address to be held in the address register and broadcast on the *Address* bus.
a) CMP b) Load and store
c) both a and b d) MOV

8) What are the values of the I and F bits in the Program Status Register on reset?
a) I=0, F=0 b) I-1,F=1
c) I=0,F=1 d) I=1,f=0

B) Write true/false: **04**

a) Abort mode generally enters when low priority interrupt is raised.
b) ALL inputs in ARM are conditionally executed.
c) The cpsr has two interrupt mask bits, 7 and 6 (or I and F), which control the masking of IRQ and FIQ, respectively.
d) 32 bit CISC processor used by ARM 7

Q.2 Answer the following (Any Six) **12**

a) Explain the advantages and disadvantages of RISC architecture.
b) What is ARM processor? Give its applications.
c) Draw the block diagram of ARM microcontroller core.
d) Why ARM is used in Mobile?
e) What are ARM exceptions?
f) Discuss clock circuit in ARM.
g) State the data types supported by ARM processors.
h) What is nested interrupts?

Q.3 Answer the following (Any Three) **12**

a) Explain program counter.
b) Write a note on UART used for LPC 2148.
c) Explain Jazzele instruction set.
d) Explain the structure of saved program status register in ARM processor.

Q.4 Answer the following (Any Two) **12**

a) Write embedded c program to interface Relay to ARM microprocessor with suitable diagram.
b) Explain in brief ARM bus architecture.
c) Give the functions of following registers in ARM processor
1) Stack Pinter
2) Link registers
3) Program counter

Q.5 Answer the following (Any Two) **12**

a) What is barrel shifter? How does it increase the speed of execution in ARM processor.
b) Draw the format of program status register in ARM processor. Explain different bits in it.
c) Explain with example Arithmetic and Logical, instruction in ARM.

Seat No.	

Set **P**

M.Sc. (Electronics) (Sem - III) (New) (NEP CBCS) Examination: March/April - 2025
Advanced Digital Design with VHDL (23131306)

Day & Date: Monday, 19-May-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

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

1) In case of VHDL, '<=' assignment operator defines _____value.
   a) signal b) variable
   c) constant d) high impedance

2) Which of the following technology is used for PLD programming?
   a) SRAM b) EPROM
   c) Flash d) All of these

3) The main purpose of HDL is to design _____ circuits.
   a) analog b) digital
   c) both a & b d) mixed technology

4) In case of VHDL, by which clause the package std_logic_1164 is accessed?
   a) library b) use
   c) type d) both a & b

5) In case of Data Types STD_LOGIC_1164 the meaning of 'L' is _____.
   a) low b) 0
   c) weak 0 d) all of these

6) In which level design of EDA, place and route _____ are included?
   a) back end b) front end
   c) both a & b d) mixed end

7) In case of LOOP statement, where exit and next statements are allowed?
   a) outside b) inside
   c) both a & b d) none of these

8) In which type of category, the GENERATE statement fall?
   a) Sequential b) Concurrent
   c) Process d) Analog

B) State True or False. **04**

1) The NAND operator and NOR operator are not associative operators.
2) The addition operator used in VHDL code is '&' operator.
3) The data information regarding a data vector is return by signal attributes.
4) The statement PROCESS is always concurrent statement.

Q.2 Answer the following. (Any Six) **12**

a) Explain the role of Library in VHDL.
b) Give the advantages of VHDL.
c) What is PAL device.
d) Give the difference between CPLD and FPGA.
e) Give the syntax of Process statement.
f) Write entity for AND gate.
g) Write the names of sequential statement for VHDL.
h) Write entity for 4:1 multiplexer.

Q.3 Answer the following. (Any Three) **12**

a) Illustrate the Entity using full adder for VHDL design.
b) Explain the LOOP statement in VHDL?
c) Explain the Attributes and Generic.
d) In case of PLD discuss architecture of FPGA.

Q.4 Answer the following. (Any Two) **12**

a) Explain the various language element of VHDL and Explain two operators in detail.
b) Explain the EDA tools. Write a note on Macrocell.
c) Give VHDL code for 8-bit input comparator.

Q.5 Answer the following. (Any Two) **12**

a) State and Explain the role of various types of architecture bodies in VHDL using suitable example.
b) What do you mean PLD devices. Discuss architecture of PAL & PLA.
c) Give VHDL code for 8:1 demultiplexer.

Seat No.	

Set P

M.Sc. (Electronics) (Sem - III) (Old) (CBCS) Examination: March/April - 2025
Digital Signal Processing (MSC21301)

Day & Date: Thursday, 15-May-2025 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) Figures to the right indicate full marks.

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

1) Which of the following is a method for Implementing an FIR system?
a) Direct form b) Cascade form
c) Lattice structure d) All of the mentioned

2) The changing or analyzing information which is measured as discrete sequences of numbers is called as ____.
a) Discrete Fourier Transform b) Sampling
c) Digital Signal Processing d) None of the mentioned

3) What is the ROC of z-transform of finite duration causal sequence?
a) Z=0
b) Z=∞
c) Entire z-plane, except at z=∞
d) Entire z-plane, except at z=0

4) The ROC of the Z-transform of any signal cannot contain ____.
a) Zero b) Poles
c) One d) None of the mentioned

5) If $x(n)$ is causal sequence then its final value is ____.
a) $x\ (0)\ =\ \mathrm{limz} \rightarrow 0\ X(Z)$
b) $x(\ 0)\ =\ \mathrm{limz} \rightarrow\ \infty\ X(Z)$
c) $x\ (\infty)\ =\ \mathrm{limz} \rightarrow 1\ X(Z)$
d) $x(\infty) = \mathrm{limz} \rightarrow 1\ X\ (\ Z)\ (1 - Z\text{^} - 1)$

6) The FT does not exist for all ____ functions.
a) Periodic b) Aperiodic
c) Symmetric d) Cyclic

7) Inverse Z transform by power series expansion is also called as ____ division method.
a) Direct b) Indirect
c) Long d) Both a and c

8) If we reverse the directions of all branch transmittances and interchange the input and output in the flow graph, then the resulting structure is called as_____.

a) Direct form-I
b) Direct form-II
c) Transposed form
d) None of the mentioned

9) Which of the following should be done in order to convert a continuous time signal to a discrete-time signal?

a) Sampling
b) Differentiating
c) Integrating
d) None of the mentioned

10) In bilinear transformation, the left-half s-plane is mapped to ____ statement in the z-domain.

a) Entirely outside the unit circle |z|=1
b) Partially outside the unit circle |z|=1
c) Partially inside the unit circle |z|=1
d) Entirely inside the unit circle |z|=1

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

1) The function given by the equation x (n) =1. for n=0; x (n) =0, for n≠0 is a unit step function.
2) FIR filters are non-recursive and do not adopt any feedback.
3) If x(n) is real then X*(ω) =X(-ω)
4) If the discrete time LTI system is BIBO stable Entire z-plane, except at z=∞ is the ROC of the system function H (z).
5) Continuous time non-periodic signal have aperiodic continuous spectra.
6) The multiplication of two DFTs is equivalent to the circular convolution of their sequences in time domain.

Q.2 Answer the following question **16**

a) Find the FT of the signal x(t)= cos(ω0t).
b) Write a note on quantization with A/D conversion.
c) What is DSP? What are the applications of DSP?
d) Write a note on Bilinear transform filter.

Q.3 **a)** Define and prove ZT of unit ramp function and comment on its ROC. **08**

b) Draw flow diagram of DITFFT for N= 16. **08**

Q.4 **a)** Prove that multiplication of two DFTs is equivalent to the circular convolution of their sequences in time domain. **10**

b) Obtain IZT using residue method from X (Z)= Z(Z+1)/(Z-1)^2 **06**

Q.5	**a)**	Determine 2-point and 4-point DFT of a sequence x(n)= u(n)-u(n-2) sketch the magnitude of DFT in both cases.	**08**
	b)	What is Kaiser Window? Explain the procedure for designing an FIR filter using the Kaiser window.	**08**
Q.6	**a)**	An analog filter has the transfer function H(s)= 1/s+1 using BLT technique determine the transfer function of digital filter H(Z) and also write the difference equation of digital filter.	**08**
	b)	Prove that ideal filters are practically not realizable.	**08**
Q.7	**a)**	Determine direct form-II realization for each of the following LTI system i) $2y(n) + y(n-1) - 4y(n-3) = x(n) + 3x(n-1)$ ii) $y(n) = x(n) - x(n-1) + 2x(n-2) - 3x(n-4)$	**10**
	b)	State and prove Initial Value Theorem.	**06**

Seat No.	

Set P

M.Sc. (Electronics) (Sem - III) (Old) (CBCS) Examination: March/April - 2025
Advanced Digital Design with VHDL(MSC21302)

Day & Date: Saturday, 17-May-2025 Max. Marks: 80
Time: 11:00 AM To 02:00 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) PLA is used to implement ____.
a) A complex sequential circuit
b) A simple sequential circuit
c) A complex combinational circuit
d) A simple combination circuit

2) Configurable logic blocks in FPGA are based on ____.
a) Look up tables b) Programmable Interconnect
c) Carry look ahead logic d) None of the above

3) SIGNED and UNSIGNED data types are defined in
a) Std_logic _1164 package b) Std_logic package
c) Std_logic_arith package d) standard package

4) If a and b are two STD_LOGIC_VECTOR input signals, then legal assignment for a and b is ____.
a) x<=a.b b) x <= a OR b
c) x <= a+b d) x <= a && b

5) The FPGA architecture has based on ____ to generate logic functions.
a) LUT b) Multiplexer
c) Macrocell d) Both a & b

6) The back-end design is used to create ____ source of design.
a) Technology b) Physical
c) Logic d) circuit

7) The ____ Is one of the ways of design entry in the CAD process.
a) HDL b) VHDL
c) Verilog d) All of the mentioned

8) Synonym of JTAG is ____.
a) Joint Test Action Group

b) Joint Test Action Goal
c) Joint Test Application Group
d) Joint Test Application Goal

9) In VHDL there are ____ types of shift operators.
a) Three b) Four
c) Five d) Six

10) Use of constant is to ____.
a) Represent default value b) Represent local information
c) Represent wires d) Pass value between entities

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

1) The WAIT statement is a concurrent statement.
2) The VHDL programming supports bread board design methodology.
3) The SRAM are the programming technologies used for PLD.
4) The front end design is used to create logic source of design.
5) Structural style of processes.
6) The operator NAND and NOR are not associative.

Q.2 Answer the following: **16**

a) Explain the architecture of FPGA.
b) Explain the advantages of PLD devices.
c) Explain the syntax of Process statement.
d) Explain the syntax of the LOOP statement.

Q.3 **a)** What do you mean Attributes and Generic. Explain it with suitable example. **08**
b) Write a note on PLA. Explain architecture of PLD's. **08**

Q.4 **a)** State and explain the role of various types of architecture bodies in VHDL using suitable example. **10**
b) Write VHDL code for 8-bit input comparator. **06**

Q.5 **a)** Explain the SPLD in detail with suitable diagram. **08**
b) Write VHDL code for ALU. **08**

Q.6 **a)** Describe the operators in the VHDL. Explain the architecture of CPLD. **08**
b) Write VHDL code for 1:8 Dmux using behavioral modeling. **08**

Q.7 **a)** Explain the EDA tools. Write a note on Macrocell. **10**
b) Write VHDL code for D flip flop using wait statement. **06**

Seat No.	

Set **P**

M.Sc. (Electronics) (Sem - III) (Old) (CBCS) Examination: March/April – 2025
ARM Microcontroller and System Design (MSC21306)

Day & Date: Monday, 19-May-2025 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) Figures to the right indicate full marks.

Q.1 A) Select the correct alternative. **10**

1) What is the significance of "!" in a load/store instruction?
   a) Don't update base register in post-indexed load/store
   b) Don't update base register in pre-indexed load/store
   c) Update base register in post-indexed load/store
   d) Update base register in pre-indexed load/store

2) In LPC 2148. I^2C bus supports bit rates upto _____.
   a) 100 Kbit/S b) 200 Kbit/S
   c) 300 Kbit/S d) 400 Kbit/S

3) The LPC 2148 is equipped with USB device controller that enables _____ M bit/s data exchange with USB host controller.
   a) 24 b) 12
   c) 6 d) 3

4) In LPC 2148, which among the following is/are 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 above

5) Thumb instruction set executes_____ bit instructions.
   a) 2 b) 4
   c) 8 d) 16

6) To increase the code density ARM uses _____.
   a) Thumb 16 bit instruction set
   b) Jazzale 32 bit instruction set
   c) 64 bit instruction set
   d) None of these

7) The synonym of AMBA is _____.
   a) ARM Microcontroller Bus Architecture
   b) ARM Micro-Bus Architecture
   c) Advanced Microcontroller Bus Architecture
   d) Advanced Micro-Bus Architecture

8) In LPC 2148, when internal reset is removed the processor begins executing at _____.
   a) address 0 b) address 1
   c) address 5 d) address 7

9) The Cache is placed between _____.
   a) Flash memory and registers
   b) Main memory and core
   c) Peripherals
   d) none of these

10) When the processor cannot decode an instruction _____ vector is used.
   a) Undefined instruction b) Reset
   c) Software interrupt d) Prefetch abort

B) State whether true or false. **06**

1) In LPC 2148 on chip static RAM is 8-40KB.
2) When subroutine is called processor stores return address in program counter.
3) LPC 2148 has three timers */* counter.
4) User mode is non- privileged mode.
5) To move from an ARM register to a status register MOV instruction is used.
6) The nature of instruction size in CISC processors is fixed.

Q.2 Write short notes on. **16**

a) Explain I^2C bus controllers of LPC 2378.
b) Give advanced features of ARM processor.
c) Write a note on watchdog timer.
d) Draw the block diagram of ARM microcontroller core.

Q.3 Answer the following. **16**

a) What is barrel shifter? How does it increase the speed of execution in ARM processor.
b) Explain the memory system of the ARM processor.

Q.4 Answer the following. **16**

a) What neat labeled block diagram describe AMBA bus architecture.
b) What do you mean by interrupt? Explain nested interrupts with its advantages.

Q.5 Answer the following. **16**

a) Explain the design of ARM LPC 2148 microcontroller based system for humidity measurement with suitable interfacing diagram.

b) Explain the following instructions.

1) MOV R1,R2,LSL #2
2) LDR R0, [R1]
3) RSB R3,R3,R3,LSL #3
4) MUL R0,R1,R2

Q.6 Answer the following. **16**

a) Interface LED and switch to ARM microprocessor and write embedded c program when switch press LED is ON.

b) Explain the functions of Stack Pointer and Program counter of ARM processor.

Q.7 Answer the following. **16**

a) Explain ADC of ARM LPC 2148 in detail.

b) Write a note on Thumb instruction and Jazzele instruction set.

Seat No.	

Set P

M.Sc. (Electronics) (Sem - IV) (New) (CBCS) Examination: March/April - 2025
Networking and Data Communication (23131401)

Day & Date: Wednesday, 14-May-2025 Max. Marks: 60
Time: 03:00 PM To 02:30 PM

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

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

1) A Bluetooth device is limited to a range of _____.
a) 1m b) 5m
c) 10m d) 20m

2) A HTTP request message always contains a request line and a _____.
a) body b) information
c) header d) status line

3) The security at network layer is provided by _____.
a) TCP b) IPsec
c) SCTP d) UDP

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

5) _____ is not a guided transmission medium.
a) Free space b) fiber optic cable
c) twisted pair cable d) coaxial cable

6) _____ of the following is a digital multiplexing technique.
a) FDM b) WDM
c) TD d) both a and b

7) The _____ uses 2.4 GHz ISM band.
a) Bluetooth b) Wi-Fi
c) I^2C d) None of these

8) WWW stands for _____.
a) Wide Web Wavelength b) World Wide Web
c) World Wide Wave d) Wide Web World

B) Write True/False. **04**

1) Standard Ethernet provides data rate of 20 Mbps.
2) Data framing is not a responsibility of the data link layer of the OSI model.
3) Image is not the type of data representation.
4) Simplest protocol does not provide error and flow control.

Q.2 Answer the following. (Any Six) **12**

a) Explain the need and types of IP Address.
b) Explain components of data communication.
c) Draw signal for sequence 010010 using AMI technique.
d) Explain in detail the physical layer of OSI model.
e) Write a note on Bluetooth technology.
f) Explain Digital Subscriber Line (DSL).
g) Give any four differences in between FTP and HTTP.
h) Write a note on Cryptography.

Q.3 Answer the following. (Any Three) **12**

a) Explain the domain name system.
b) Explain IPV6 addressing.
c) Write a note on stop and wait ARQ protocol.
d) Explain Architecture of WWW.

Q.4 Answer the following. (Any Two) **12**

a) Explain SONET Network.
b) Describe DNS in the internet.
c) Explain the concept of UDP and TCP.

Q.5 Answer the following. (Any Two) **12**

a) Explain Internet Protocols for Internetworking.
b) What is mean by Network? Explain categories of Network.
c) Write a note on SMTP and HTMP.

Seat No.	

Set **P**

M.Sc. (Electronics) (Sem - IV) (New) (CBCS) Examination: March/April - 2025
Mechatronics and Industrial Automation (23131403)

Day & Date: Friday, 16-May-2025 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 the correct alternative. **08**

1) An internal relay in a PLC does not control a physical device, but is used for _____.
a) Redundancy b) Internal logic
c) Delays d) Manual override

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

3) The primary goal of mechatronics is to improve product _____.
a) Size b) Packaging
c) Performance d) Color

4) PLCs are typically programmed using _____ logic.
a) Ladder b) Boolean
c) Mathematical d) C++

5) The full form of SCADA is _____.
a) Supervisory Control and Document Acquisition
b) Supervisory Control and Data Acquisition
c) Supervisory Column and Data Assessment
d) None of the above

6) The output coil in ladder logic represents the control of an _____.
a) Operator b) Alarm only
c) Actuator d) Equation

7) The CPU of the PLC executes the user program and performs _____ operations.
a) Arithmetic and logic b) Graphical and drawing
c) Painting and welding d) Timing only

8) In SCADA systems, RTUs and PLCs collect data from _____ devices.

a) Network b) Remote field
c) Virtual d) Cloud-based

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

1) The Boolean expression is not used for PLC programming.
2) Solenoids, lamps, motors are connected to Digital output.
3) RTU stands for Remote Transfer Unit.
4) The +5Volt is nominal DC voltage given to PLC.

Q.2 Answer the following question (Any Six) **12**

a) Draw structure of RTU.
b) Write note on PLC's instructions
c) Write note on Modbus.
d) Write note on standard Symbols.
e) Explain Components of the PLC.
f) Draw Basic architecture of DCS.
g) Define Centralized Control system (CCS).
h) Explain Memory.

Q.3 Answer the following question (Any Three) **12**

a) Write note on PLC Devices.
b) Write note on Counter functions.
c) Explain Concept of industrial automation.
d) Compare DCS and CCS.

Q.4 Answer the following question (Any Two) **12**

a) Explain SCADA Architecture in detail.
b) Compare Open and closed loop systems.
c) Write Ladder program to turn on motor after 05 minute.

Q.5 Answer the following question (Any Two) **12**

a) Explain Master Control relay with suitable example.
b) Write note on Boolean algebra programming.
c) Design of Ladder diagrams for process control with suitable example.

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Seat No.	

Set P

M.Sc. (Electronics) (Sem - IV) (New) (CBCS) Examination: March/April - 2025
Microwave Devices, Antennas and Measurements (23131406)

Day & Date: Tuesday, 20-May-2025 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) 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

2) _____ is a single cavity klystron tube that operates as on oscillator by using a reflector electrode after the cavity
a) Backward wave oscillator b) Reflex klystron
c) Travelling wave tube d) Magnetrons

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

4) The Gauss law employs _____theorem for the calculation of charge density?
a) Green theorem b) Stokes theorem
c) Gauss theorem d) Maxwell equation

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

6) GaAs is used in fabricating Gunn diode. Gunn diode is _____
a) bulk device
b) sliced device
c) made of different type of semiconductor layers
d) none of these

7) Maxwell's equation for electromagnetic waves in a waveguide is _____.
a) $\nabla \mathrm{x} \mathrm{E} = -\mathrm{j}\omega\mu$ (vector H) b) $\nabla \mathrm{x} \mathrm{E} = -\mathrm{j}\omega\mu$ (vector E)
c) $\nabla \mathrm{x} \mathrm{H} = -\mathrm{j}\omega\mu$ (vector H) d) $\nabla \mathrm{x} \mathrm{H} = -\mathrm{j}\omega\mu$ (vector H)

8) Silicon and germanium are called _____ semiconductor

a) direct gap b) indirect gap
c) band gap d) indirect band gap

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

1) The electrodes of a Gunn diode are made of molybdenum.
2) The dominant mode in the TM waves is TM_{20}
3) The first Maxwell law is based on Faraday and Lenz law.
4) The transmission line to be matched to the load, the condition to be satisfied is $Z_L \neq Z_0$.

Q.2 Answer the following: (Any Six) **12**

a) Explain Modes in waveguides.
b) What is Rat-Race junction?
c) Write a note on TE and TM modes.
d) Sate properties of S-matrix.
e) What is tee? Mention types of it.
f) Explain rectangular waveguide.
g) Define isolators.
h) State boundary conditions.

Q.3 Answer the following. (Any Three) **12**

a) Write a note on Lossy dielectric material.
b) Explain Co-axial connectors.
c) Explain waveguide. What are the features of waveguide?
d) Write a note on characteristics impedance.

Q.4 Answer the following. (Any Two) **12**

a) Write a note on Smith chart. Calculate the center and radius of the Rn circle.
b) Explain Shunt Tee.
c) A transmission line has following parameters R= 2Ωm, G= 0.5 m ʊ/m, F=1GH_Z, L=8nH/m, C=0.23pF calculate
   a) Characteristics impedance
   b) Propagation constant

Q.5 Answer the following. (Any Two) **12**

a) Explain double stub matching method.
b) Discuss Slot antenna and Microstrip Antennas.
c) Derive the wave equation for TE and TM waves.

Seat No.	

Set P

M.Sc. (Electronics) (Sem - IV) (New/Old) (CBCS) Examination: March/April - 2025
Microwave Devices, Antennas and Measurements (MSC21401)

Day & Date: Wednesday, 14-May-2025 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 right indicate full marks.

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

1) GaAs is used in fabricating Gunn diode. Gunn diode is _____.
a) sliced device
b) bulk device
c) made of different type of semiconductor layers
d) None of these

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

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

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

5) In transverse magnetic waves, _____.
a) E is parallel to H
b) H is parallel to wave direction
c) H is transverse to wave direction
d) E is transverse to H

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

7) The Gauss law employs _____ theorem for the calculation of charge density.
a) Green theorem b) Stokes theorem
c) Maxwell equation d) Gauss theorem

8) Maxwell's equation for electromagnetic waves in a waveguide is _____.

a) $\nabla \times \mathrm{E} = -\mathrm{j}\omega\mu$(vector H) b) $\nabla \times \mathrm{E} = -\mathrm{j}\omega\mu$(vector E)
c) $\nabla \times \mathrm{H} = -\mathrm{j}\omega\mu$(vector H) d) $\nabla \times \mathrm{H} = \mathrm{j}\omega\mu$(vector H)

9) _____ is not an Omni-directional antenna.

a) Half-wave dipole b) Marconi
c) Discone d) Logic periodic

10) The klystron tube used in a klystron amplifier is a _____ type beam amplifier.

a) Crossed field b) Linear beam
c) Parallel field d) None of these

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

1) A major disadvantage of klystron amplifier is Low bandwidth.
2) Strip lines are not a type TEM line used in microwave networks.
3) In a backward wave oscillator, the RF wave travels along the helix from the collector towards the electron gun.
4) A hollow rectangular waveguide support TEM mode of propagation.
5) Power radiated from an antenna per unit solid angle is called radiation intensity.
6) The transmission line to be matched to the load, the condition to be satisfied is $\mathrm{Z_L} \neq \mathrm{Z_0}$

Q.2 Answer the following: **16**

a) Explain Twists, bends, corners.
b) Write a note on SWR.
c) Explain Circulators and Isolators.
d) What is Microwave? What are the applications of microwave?

Q.3 Answer the following.

a) What are the methods for impedance matching? Explain any one of them. **08**
b) What are the Maxwell's equations? Explain with its boundary conditions. **08**

Q.4 Answer the following.

a) Write a note on Rat Race Junction. Explain Directional Couplers. **08**
b) Explain Klystrons and Multicavity Klystron Amplifiers. **08**

Q.5 Answer the following.

a) Explain hyperbolic function. Derive the expression for hyperbolic function. **10**
b) Discuss Slot antenna and Microstrip Antennas. **06**

Q.6 Answer the following.

a) Write a note on Cavity Resonator. Calculate Expression for f_0 in rectangular cavity resonator. **08**

b) Write a note on transmission line. Derive the transmission line equation. **08**

Q.7 Answer the following.

a) A certain transmission line has characteristics impedance is $[75 + j0.01\Omega]$ and is terminated in load impedance of $[70 + j50\Omega]$ compute **10**

i) Reflection coefficient (Γ)

ii) Transmission coefficient (T)

iii) $T^2 = \frac{Zl}{Zo}[1 - \Gamma_1{}^2]$

b) Write a note on InP diode. **06**

Seat No.	

Set | P

M.Sc. (Electronics) (Sem - IV) (New/Old) (CBCS) Examination: March/April - 2025
Networking and Data Communications (MSC21402)

Day & Date: Friday, 16-May-2025 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) _____ 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

2) Photonic layer of SONET has resemblance with _____ layer of the OSI model.
a) physical b) data link
c) network d) transport

3) Use of _____ prevents signal overlapping in FDM.
a) guard band b) band pass filter
c) amplifier d) low pass filter

4) Flag field of an HDLC frame is _____.
a) 01111110 b) 10101010
c) 01010101 d) 11111111

5) In ADSL, channel 0 of the bandwidth is reserved for _____ communication.
a) Upstream b) Downstream
c) Voice d) Idle

6) Fiber optic cable carries the signal in the form of _____.
a) voltage b) current
c) microwave d) light

7) _____ layer of OSI provides the interface to the user to use the e-mail service.
a) Transport b) Session
c) Application d) Presentation

8) _____ coding technique removes the problem of baseline wandering.
a) Manchester b) NRZ-I
c) NRZ-L d) RZ

9) _____ is not a guided transmission medium.

a) Free space b) Fiber optic cable
c) Twisted pair cable d) Coaxial cable

10) _____ standard is used to specify any information over internet.

a) WWW b) HTTP
c) Browser d) URL

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

1) Network interfacing card of a host provides its Physical address.
2) Noise means the signal loss in data communication.
3) Image is not the type of data representation.
4) Simplest protocol does not provide error and flow control.
5) A BSS with AP is referred to as infrastructure network.
6) Star topology has Point-to-point dedicated link with all devices in the network.

Q.2 Answer the following. **16**

a) Write a note on Cryptography.
b) Explain the need and types of IP Address.
c) Explain Digital Subscriber Line (DSL).
d) Write a note on ATM technology.

Q.3 Answer the following. **16**

a) Describe data transmission for analog & digital signal.
b) Explain in detail OSI & TCP/IP- Layered architecture.

Q.4 Answer the following. **16**

a) Explain in detail wired LAN Ethernet types.
b) Write a note on Routers and Gateway.

Q.5 Answer the following. **16**

a) Explain Bluetooth technology.
b) Explain in detail Electronic Mail (SMTP) and File Transfer.

Q.6 Answer the following. **16**

a) Discuss Network Security services.
b) Explain Internet Protocols for Internetworking.

Q.7 Answer the following. **16**

a) Explain the concept of UDP and TCP.
b) Write a note on SMTP and HTMP.

Seat No.	

Set P

M.Sc. (Electronics) (Sem - IV) (New/Old) (CBCS) Examination: March/April - 2025
Nanoelectronics (MSC21403)

Day & Date: Tuesday, 20-May-2025 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) If characteristics $\lambda \geq$ Lx, Ly and Lx Ly $\ll$Lz then it stands for quantum _____.
a) dot b) wire
c) well d) bulk

2) 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

3) The superlattice consists of a _____ set Multiple Quntum well (MQW)
a) irregular b) regular
c) periodic d) none of these

4) 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

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

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

7) 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

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

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

10) The _____ is the organic semiconductors
a) Poly Phenylene Vinylene (PPV)
b) Poly Flu Orene (PFO)
c) C-60
d) all of these

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

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

Q.2 Answer the following: **16**

a) Explain Split-Gate technique.
b) Explain the square quantum well of finite depth.
c) Explain the quantum wire and dot with respect to the characteristics length.
d) Discuss the limitations of microelectronics

Q.3 **a)** Explain in detail Single Electron Transistor. **09**
b) Explain the modulation doped quantum wells **07**

Q.4 **a)** Explain in detail basic properties of two-dimensional semiconductor nanostructures. **10**
b) Write a note on quantum dots. **06**

Q.5	**a)**	Explain the parabolic and triangular quantum well.	**10**
	b)	Write a note on Multiple Quantum Well (MQW).	**06**
Q.6	**a)**	Explain the fabrication methods of nanomaterials.	**09**
	b)	Explain in detail Heterojunctions semiconductors.	**07**
Q.7	**a)**	Explain the Resonant tunnelling effect and discuss the three terminal Resonant tunnelling devices.	**10**
	b)	Write a note on concept of superlattice.	**06**

Seat No.	

Set **P**

M.Sc. (Electronics) (Sem - IV) (New/Old) (CBCS) Examination: March/April - 2025
Mechatronics and Industrial Automation (MSC21406)

Day & Date: Thursday, 22-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Questions 1 and 2 are compulsory.
2) attempt any three from Q. No. 3 to Q. No. 7.
3) Figure to the right indicates full marks.

Q.1 A) Multiple choice questions: **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
e) Pressure Loss Chamber

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) Supervisory Column and Data Assessment

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 or 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: **16**

a) Write note on Concept of industrial automation.
b) Explain the architecture of RTU with suitable diagram
c) Write note on registers.
d) What do you mean by SCADA Protocols.

Q.3 Answer the following:

a) Write Timer function of PLC in detail with suitable example. **10**
b) Write note on Arithmetic functions. **06**

Q.4 Answer the following:

a) Draw Ladder diagram program to ON-OFF the out device and its equivalent circuit diagram. **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)	Write not on system modeling.	**08**

Q.6 Answer the following:

a)	What is SCADA? Explain types of SCADA in details.	**10**
b)	Explain in detail architecture of DCS	**06**

Q.7 Answer the following:

a)	List the advantages and disadvantages of mechatronics systems.	**10**
b)	Explain the IO modules and their Characteristics.	**06**