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Set P

M.Sc. (Electronics Science) (Sem - I) (New) (NEP CBCS) Examination: March/April - 2025
Electronic System Design (2320101)

Day & Date: Thursday, 15-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.
3) Draw neat and labeled diagrams wherever necessary

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

1) What is the typical output voltage of a 7805 regulator?
a) 12V b) 5V
c) 9V d) 3.3V

2) Which of the following is used to measure displacement in an LVDT?
a) Inductive sensor b) Capacitive sensor
c) Thermistor d) RTD

3) The IC 555 timer can be used to design:
a) Astable multivibrator b) Full adder
c) Binary counter d) Differential amplifier

4) In a Wien Bridge Oscillator, which component determines the frequency?
a) Resistor b) Capacitor
c) Inductor d) Diode

5) Zener diodes are used in:
a) Amplifiers b) Voltage regulators
c) Oscillators d) Filters

6) The output of a Schmitt trigger is:
a) Analog b) Square wave
c) Triangular wave d) Sine wave

7) LDR abbreviated as _____
a) Light Detected resistor b) Luminance Dependent resistor
c) Light Determinant resistor d) Light Dependent resistor

8) RTD sensors are usually made from:
a) Nickel b) Copper
c) Platinum d) Silver

B) Fill in the blanks OR Write True/False **04**

a) RTDs have a positive temperature coefficient. (True/False)
b) The 7414 IC is used as a Schmitt trigger. (True/False)
c) A full adder circuit can be designed using a multiplexer.
d) The standard current output for industrial sensors is _____ mA.

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

a) Explain the difference between a series and shunt regulator.
b) What is the working principle of a thermistor?
c) Describe how an astable multivibrator works using a 555 timer.
d) What are the advantages of CMOS logic circuits?
e) How does an LVDT function?
f) Explain the use of a Schmitt trigger in oscillator circuits.
g) Define ORP and its significance in measurement systems.
h) How can a parity checker be designed using XOR gates?

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

a) Design a monostable mv using IC 555.
b) Explain the working principle of a digital multimeter using IC 7107.
c) Discuss the need for signal conditioning in measurement systems.
d) Design a triangular waveform generator using an op-amp.

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

a) Explain the design of a monostable mv using IC 741.
b) Explain the working of zener diode as a series and shunt regulator.
c) Design a circuit to convert binary code to Gray code.

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

a) Design a 16-to-1 multiplexer using 4-to-1 MUXs.
b) Explain the principle and design of a capacitance meter.
c) Describe the working of a thermometer and thermocouple.

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M.Sc. (Electronics Science) (Sem - I) (New) (NEP CBCS) Examination: March/April - 2025
Microcontroller & Interfacing (2320102)

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.
3) Draw neat and labeled diagrams wherever necessary

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

1) ____ is the size of the program memory in PIC16F877A.
a) 4 KB b) 8 KB
c) 14 KB d) 32 KB

2) ____ I/O ports does the PIC16F877A have.
a) 2 b) 3
c) 5 d) 7

3) ____ is the clock frequency range of PIC16F877A.
a) 0-5 MHz b) 0-20 MHz
c) 0-25 MHz d) 0-30 MHz

4) ____ type of architecture does PIC16F877A use.
a) Harvard b) Von Neumann
c) Modified Harvard d) None of the above

5) ____ is the resolution of the ADC in PIC16F877A.
a) 8-bit b) 10-bit
c) 12-bit d) 16-bit

6) What is the data bus width of AVR32?
a) 8-bit b) 16-bit
c) 32-bit d) 64-bit

7) How many general-purpose registers are there in AVR32?
a) 16 b) 32
c) 64 d) 128

8) What is a key application area of AVR32 microcontrollers?
a) Automotive systems b) Digital signal processing
c) Consumer electronics d) All of the above

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

1) AVR32 follow RISC instruction set.
2) The addressable memory space of AVR32 is 4 GB.
3) AVR32 support UART debugging feature.
4) ROM memory is used for storing the firmware in PIC16F877A.

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

a) What are the main features of the PIC16F877A microcontroller?
b) Explain the function of the PORTB in PIC16F877A.
c) What is the significance of the watchdog timer in PIC16F877A?
d) List the types of memories available in PIC16F877A and their uses.
e) Describe the ADC module in PIC16F877A and its resolution.?
f) Explain the concept of the RISC architecture in AVR32.
g) What debugging options are supported by the AVR32 microcontroller?
h) Describe the role of SIMD instructions in AVR32.

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

a) Describe the process of interfacing an LED with PIC16F877A with circuit diagram.
b) Explain the steps involved in programming the PIC16F877A microcontroller using MPLAB.
c) Compare and contrast the Harvard and RISC architectures in the context of AVR32.
d) Explain the applications of AVR32 microcontrollers in embedded systems with examples.

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

a) Describe the memory organization of PIC16F877A, focusing on program memory, data memory, and EEPROM.
b) Explain how serial communication is achieved using the USART module in PIC16F877A.
c) Explain the architecture of AVR32 microcontroller with a suitable diagram and discuss its key components.

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

a) Describe the process of interfacing of LM35 temperature sensor with PIC16F877A.
b) Describe timers of PIC16F877A.
c) Explain registers of AVR32.

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M.Sc. (Electronics Science) (Sem - I) (New) (NEP CBCS) Examination: March/April - 2025
Digital Electronics & Verilog HDL (2320108)

Day & Date: Monday, 19-May-2025 Max. Marks: 60
Time: 03:00 AM 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) The output of a full adder is a function of how many inputs?
a) 2 b) 3
c) 4 d) 1

2) Which logic gate is known as an inverter?
a) OR gate b) NAND gate
c) NOT gate d) XOR gate

3) How many flip-flops are required to design a MOD-16 counter?
a) 2 b) 3
c) 4 d) 5

4) In Verilog, which data type is used for storing binary values?
a) reg b) wire
c) integer d) time

5) A half-adder consists of:
a) XOR and AND gates b) AND and OR gates
c) XOR and OR gates d) XOR and NAND gates

6) Which Verilog construct is used to define a parameterized module?
a) module b) generate
c) parameter d) always

7) In a synchronous circuit, the flip-flops change their states:
a) At the same time b) At different times
c) When the reset is high d) Independently of the clock

8) A JK flip-flop toggles when:
a) J = 0, K = 0 b) J = 1, K = 1
c) J = 1, K = 0 d) J = 0, K = 1

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

a) An SR flip-flop can produce an invalid output state.
b) A decoder converts binary data into multiple output lines.
c) Verilog supports both procedural and dataflow modeling styles.
d) The output of a NAND gate is high only when all inputs are high.

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

a) Define Comparator.
b) What is Decoder?
c) Define gate level modelling.
d) What is PLD?
e) What is the difference between active-high and active-low signals?
f) Explain the operation of a T flip-flop.
g) Define minterms and maxterms in Boolean algebra.
h) Write the Verilog code for a simple 1-bit full adder.

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

a) Discuss the differences between combinational and sequential circuits.
b) Derive the canonical SOP expression for a 3-variable Boolean function.
c) Design half adder using K map and realize it using basic gates.
d) Write Verilog code for D Flip Flop using behavioral modeling style.

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

a) Explain in detail n-bit parallel adder.
b) Implement a Verilog code for a Mealy state machine to detect the sequence "110".
c) Explain Ring counter with its timing diagram.

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

a) Design a 4-bit arithmetic circuit to perform addition and subtraction using full adders and explain its operation.
b) Explain the advantages of hierarchical design in Verilog and how it simplifies large circuits.
c) Discuss the differences between CMOS and TTL logic families with examples and applications.

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M.Sc. (Electronics Science) (Sem - I) (New) (NEP CBCS) Examination: March/April - 2025
Research Methodology (2320103)

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) ____ type of research uses numbers and statistical tools.
a) Qualitative research b) Quantitative research
c) Action research d) Basic research

2) ____ hypothesis represent in research.
a) A statement of fact
b) An educated guess or assumption
c) A final conclusion
d) None of the above

3) Research is ____.
a) Searching again and again
b) Finding solution to any problem
c) Working in a scientific way to search for truth of any problem
d) None of the above

4) Survey is a ____ Study.
a) Descriptive b) Fact finding
c) Analytical d) Systematic

5) ____ type of research deals with past records to study events?
a) Descriptive research b) Historical research
c) Experimental research d) Longitudinal research

6) The first page of the research report is ____.
a) Appendix b) Bibliography
c) Index d) Title Page

7) ____ of the following is a secondary data source.
a) Surveys b) Journals
c) Experiments d) Focus groups

8) ____ is a key advantage of secondary data.

a) Up-to-date and relevant b) Cost-effective and time-saving
c) High reliability d) Easy to manipulate

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

1) Secondary data refers to data collected directly by the researcher.
2) The independent variable is the variable that is manipulated by the researcher.
3) Peer-reviewed articles are considered more reliable than non-peer-reviewed articles.
4) Validity refers to the consistency of a measurement tool.

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

a) What is meant by sampling error?
b) State two advantages of using secondary data in research.
c) Define Hypothesis?
d) What do you mean by research explain briefly?
e) What do you mean by graphical representation of data?
f) What do you mean by analysis of Data?
g) Mention two types of research designs.
h) Define the term "population" in research.

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

a) Discuss the advantages and limitations of using qualitative research methods.
b) What is qualitative and quantitative research?
c) Explain the importance and components of a research design.
d) Write a note on Methods of Collecting Secondary Data.

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

a) Explain types of research.
b) Describe the mixed methods approach to research and its advantages.
c) Explain criteria for selection of research problem.

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

a) Explain procedure for reviewing the literature.
b) Explain the steps involved in writing research report in detail.
c) Discuss the various methods of data collection in research with examples.

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M.Sc. (Electronics Science) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Control System (2320201)

Day & Date: Wednesday, 14-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 key advantage of PI controller is that it eliminates the ____ signal.
a) Reference b) Offset
c) Actuating d) Control

2) The steady state due to unit step input to a type 1 system is ____.
a) 1 b) 0
c) 1+Kp d) 1/(1+kp)

3) Routh Hurwitz criterion gives number of roots in ____.
a) the right half of the s-plane
b) Value of the roots
c) the left half of the s-plane
d) the top half of the s-plane

4) Loop which do not possess any common node are said to be ___ loops.
a) Forward gain b) Touching
c) Non touching d) Feedback gain

5) The output of the feedback control system must be a function of ____ signal.
a) Reference input b) Reference output
c) Output and feedback d) Input and feedback

6) ____ is not the feature of modern control system.
a) Quick response b) Accuracy
c) Correct power level d) No oscillation

7) The transfer function for a P-D controller is ____.
a) $K_P + K_D s$ b) K_I / s
c) K_P d) $K_D s$

8) ____ controller has the maximum stabilising time.
a) PD b) PID
c) D d) PI

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

a) The term hysteresis is associated with ON-OFF control.
b) Traffic light system is the example of open loop control system.
c) The bandwidth for a good control system is very small.
d) Feedback control system is basically high pass filter.

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

a) What is the difference between polar plot and Nyquist plot?
b) What are the properties of state transition matrix?
c) What is meant by state in control system?
d) Why do you need a feedback controller? Justify your answer with an example.
e) What are the advantages of State variable model of dynamic system?
f) What are the different types of control system?
g) What is the effect on polar plot if a pole is added to the transfer function?
h) Explain Lag compensation.

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

a) Explain the general procedure to construct bode plot.
b) Compare between AC and DC servomotor.
c) Define effect of feedback on sensitivity, stability and gain.
d) Write a short note Proportional integral (PI) controller.

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

a) Obtain the unit step response of a unity feedback system whose open loop transfer function G(S) = 4/S(S+5).
b) Explain the Routh's criteria with an example. What are its limitations?
c) Define and explain about the transfer function in control system.

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

a) State and explain the Mason's gain formula with an example.
b) Explain Proportional integral derivative (PID) controller. Derive its transfer function.
c) Write the various construction rules to develop the root locus.

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M.Sc. (Electronics Science) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Mechatronics (2320202)

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) Select the correct answer: **08**

1) ____ of the following is an output device in a mechatronic system.
a) Sensor b) Actuator
c) Transducer d) Thermocouple

2) ____ type of system is a thermostat controlling room temperature.
a) Open-loop b) Closed-loop
c) Feedback-less d) Hydraulic system

3) ____ is not a type of mechanical sensor.
a) Load cell b) Strain gauge
c) Encoder d) LED

4) ____ type of signal does an analog sensor generate.
a) Digital b) Binary
c) Continuous d) Intermittent

5) ____ device measures rotational speed in a mechatronic system.
a) Tachometer b) Thermistor
c) Solenoid d) Potentiometer

6) ____ is the primary function of a relay in a circuit.
a) Measure current b) Store energy
c) Control high-current devices d) Provide voltage regulation

7) ____ of the following is an example of a hydraulic actuator.
a) Solenoid b) Linear cylinder
c) Stepper motor d) DC motor

8) ____ type of feedback does a closed-loop system use.
a) No feedback b) Continuous feedback
c) Intermittent feedback d) Random feedback

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

a) An encoder converts analog signals to digital signals.
b) A stepper motor operates without feedback.
c) Thermocouples are used to measure pressure.
d) Pneumatic systems are less energy efficient compared to hydraulic systems.

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

a) Mention two advantages of using stepper motors in automation.
b) What does the term "signal conditioning" mean?
c) Name two commonly used transducers in mechatronic systems.
d) What is the main difference between hydraulic and pneumatic systems?
e) Define the term "encoder" and its use in mechatronics.
f) What are the benefits of using MEMS (Micro-Electro-Mechanical Systems)?
g) Explain the function of a relay in an electrical circuit.
h) What are the key components of a PLC (Programmable Logic Controller)?

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

a) Give the names of the mechanical components & explain briefly about Pulleys.
b) What are the disadvantages of open-loop systems?
c) What is single phase & Three phase power supply?
d) List four common types of sensors used in mechatronics.

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

a) Explain Pneumatic actuation system.
b) Describe the working principle and application of a DC motor.
c) Explain mechatronics system 1) Washing Machine

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

a) Explain Electrical actuation system.
b) Explain AC motors.
c) Discuss the role of sensors and actuators in industrial automation.

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Set **P**

M.Sc. (Electronics Science) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Advanced Microcontrollers and protocols (2320208)

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

Instructions: 1) All Questions are compulsory.
2) Figures to the right indicates full marks.

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

1) ARM stands for _____.
   a) Advanced Rate Machines
   b) Advanced RISC Machines
   c) Artificial Running Machines
   d) Aviary Running Machines

2) The main importance of ARM micro-processors is providing operation with _____.
   a) Low cost and low power consumption
   b) Higher degree of multi- tasking
   c) Lower error or glitches
   d) Efficient memory management

3) ARM processors where basically designed for _____.
   a) Main frame systems b) Distributed systems
   c) Mobile systems d) Super computers

4) The address space in ARM is _____.
   a) 2^{24} b) 2^{64}
   c) 2^{16} d) 2^{32}

5) The address system supported by ARM systems is/are _____.
   a) Little Endian b) Big Endian
   c) X-Little Endian d) Both Little & Big Endian

6) RISC stands for _____.
   a) Restricted Instruction Sequencing Computer
   b) Restricted Instruction Sequential Compiler
   c) Reduced Instruction Set Computer
   d) Reduced Induction Set Computer

7) Each instruction in ARM machines is encoded into _____ Word.
   a) 2 byte b) 3 byte
   c) 4 byte d) 8 byte

8) The effective address of the instruction written in Post-indexed mode, MOVE[Rn]+Rm is _____.
   a) EA = [Rn] b) EA = [Rn + Rm]
   c) EA = [Rn] + Rm d) EA = [Rm]+ Rn

B) State true or false **04**

1) The ARM processors don't support Byte addressability.
2) ARM7TDMI has 37 registers (31 GPR and 6 SPR).
3) ARM7 has an in-built debugging device.
4) The original ARM7 was based on the earlier ARM6 design and used the same ARMv3 instruction set.

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

a) Write the main features of ARM7.
b) Write four advantages of RISC architecture.
c) What is I2C in microcontrollers?
d) What is vector table in ARM?
e) What is ARM instruction?
f) What is Thumb instruction?
g) What is Keil?
h) What is Program status register.

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

a) Explain exceptions in ARM.
b) Explain interrupts in ARM.
c) Explain memory structure in ARM.
d) Write a embedded c program to turn on and off led.

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

a) Interface a relay to ARM and write embedded c program & Explain.
b) Interface the switch to ARM & Write a embedded code to read status of switch & Explain.
c) What are access levels? Write C program to go from privileged mode to user mode.

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

a) Explain I2C protocol in detail.
b) Explain SPI protocol in detail.
c) Explain CAN protocol in detail.

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M.Sc. (Electronics Science) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Advanced Power Electronics (2320209)

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

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

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

1) From the following ____ is the fastest switching device.
a) Diode **b)** BJT
c) JFET **d)** MOSFET

2) A snubber circuit is used to Limit the rate of rising in voltage across ____.
a) BJT **b)** Diode
c) SCR **d)** MOSFET

3) In the forward blocking mode of a silicon-controlled rectifier, the SCR is in ____ state.
a) Conducting **b)** ON
c) OFF **d)** Reverse

4) Choppers convert the ____ power.
a) DC to DC b) AC to DC
c) AC to AC d) DC to AC

5) For high power applications are used as static switches, whereas for low power applications ____ are used.
a) Transistors, SCRs b) SCRs, transistors
c) Diodes, transistors d) SCRs, diodes

6) A thyristor (SCR) is a ____ device.
a) P-N-P b) N-P-N
c) P-N-P-N d) P-N

7) The three terminals of the IGBT are ____, emitter & collector.
a) Gate b) Base
c) Source d) Drain

8) The rectifier converts ____.

a) AC to AC b) AC to DC
c) DC to DC d) DC to AC

B) Fill in the blanks or write True or false: **04**

1) The thyristor turn-off requires that the anode current falls below the holding current.
2) di/dt protection is provided to the thyristors by connecting an inductor in series with the load.
3) SMPS is used for obtaining controlled ac power supply.
4) The single phase half wave controlled rectifier uses four SCR'S.

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

a) What is LPS?
b) Define holding current of SCR.
c) List any four applications of Thyristors.
d) Draw the circuit of Diode in forward bias mode.
e) What is meant by boost regulator?
f) Define the inverters.
g) What is the role of freewheeling diode in converter?
h) What is over current protection of thyristors?

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

a) Describe the working of an MOSFET. Explain in short its switching characteristics.
b) What is Power transistor? Explain its switching characteristics.
c) With neat circuit diagram explain the linear shunt voltage regulator.
d) With neat circuit diagram explain the dv/dt and di/dt protection of SCR.

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

a) Explain the operation of step down chopper and derive an expression for its output voltage.
b) Draw and explain MOS-controlled thyristors with neat diagram.
c) With the help of a neat circuit diagram and waveforms, explain the operation of three phase fully controlled bridge rectifier with R load.

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

a) With a neat circuit diagram, explain the operation and working of buck-boost regulator.Draw the load voltage and load current waveforms.
b) With the help of a neat circuit diagram and waveforms, explain the operation of single phase half wave controlled rectifier with RL load.
c) Draw and explain the block schematic of UPS and mention its advantages over linear power supply.

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Set P

M.Sc. (Electronics Science) (Sem - III) (New) (NEP CBCS) Examination: March/April - 2025
Internet of Things (2320301)

Day & Date: Thursday, 15-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) Select the correct answer. **08**

1) ____ of the following is used to reprogram a Boot loader in IoT devices.
a) VHDL programming b) IDE
c) ICSP d) MANET

2) ____ of the following is not related to Arduino IDE IoT software.
a) Serial monitor b) Verify
c) Upload d) Terminate

3) ____ is the component of an IoT system that executes a program.
a) A sensor b) A microcontroller
c) An actuator d) ADC converter

4) ____ programming language is used by Arduino IDE IoT software for writing codes?
a) Python b) Java
c) C/C++ d) JavaScript

5) An IoT network is a collection of ____ devices.
a) Signal b) Machine to Machine
c) Interconnected d) Network to Network

6) ____ of the following cannot be considered an IoT device?
a) Smart watch b) Android Phone
c) Laptop d) Tube light

7) The storage is ____ in IoT.
a) Limited b) Unlimited
c) not available d) All of these

8) IoT is based on ____ technology.
a) Hardware b) Software
c) None d) Both of these

B) Write True or false: **04**

1) The role of Cloud in smart grid architecture of IoT is to manage data.
2) The phrase 'Internet of Things' was coined by Kevin Ashton in 1999.
3) Three elements are in the Open IoT Architecture.
4) Low Protocol Wide Area Network is the full form of the LPWAN.

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

a) Explain characteristics of IoT.
b) What is features of UAV network?
c) Explain sensor network.
d) What are the features of Raspberry Pi?
e) What are types of cloud services?
f) Write application of Wireless sensor network (WSN).
g) What are the different variants of Raspberry Pi?
h) Write features of Arduino UNO.

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

a) Explain applications of IoT.
b) Explain any two network protocols of IoT.
c) Explain advantages & disadvantages of IoT.
d) What are the differences between IoT and M2M?

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

a) What is actuator? Explain need, classification & applications of actuator.
b) What is sensor? Explain need, classification & applications of sensor.
c) Explain IoT architecture in detail.

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

a) Explain cloud computing in detail.
b) Explain any one of the Health IoT system implementations in detail.
c) Explain steps how LED interface with Raspberry Pi.

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Set **P**

M.Sc. (Electronics Science) (Sem - III) (New) (NEP CBCS) Examination: March/April - 2025
Advance Embedded System (2320302)

Day & Date: Saturday, 17-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) Select the correct answer. **08**

1) The ARM core uses _____Architecture.
a) RISC b) CISC
c) Both d) None

2) ARM Processor specifically designed for to reduce ____.
a) Size b) Power Consumption
c) both a & b d) None

3) _____ register is used as the stack pointer.
a) r_{13} b) r_{14}
c) r_{15} d) r_{16}

4) ____ register is called the link register.
a) r_{13} b) r_{14}
c) r_{15} d) r_{16}

5) In ARM program register has ____types.
a) 2 b) 3
c) 4 d) 5

6) Privileged mode allows ____ access.
a) read b) write
c) both d) none

7) How many bank registers are available in ARM?
a) 20 b) 25
c) 30 d) 40

8) The SPSR store the ____ mode of CPSR.
a) present b) previous
c) both d) none

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

1) Fetch is the process of loading instructions.
2) MMU means memory mask unit.
3) ARM instruction commonly takes 4 operands.
4) Real time systems must have preemptive kernels.

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

a) What are applications of embedded systems.
b) Write down the main differences between RISC & CISC architecture.
c) Draw block diagram of five stage pipeline in ARM.
d) Explain functions of real time operating systems.
e) What are types of architectures in processor.
f) Explain in any two instructions of ARM from Data Processing Instruction group.
g) Explain in brief ARM nomenclature.
h) Write classification of embedded system.

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

a) Differentiate between Traditional OS & Real Time OS.
b) Explain data core flow model of ARM.
c) Write a note on basic block diagram of any Embedded systems.
d) Write a note on recent trends in Embedded systems.

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

a) Explain I2C & SPI Protocol
b) Explain register set in ARM
c) Explain the 3 stage pipeline of ARM organization.

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

a) Explain objects (message, queue, pipes, mailbox & event) of RTOS
b) Discuss case study of mobile phones
c) Explain terms: 1) DAC 2) PLL 3) RTC module

SLR-ZH-15

Seat No.	

Set P

M.Sc. (Electronics Science) (Sem - III) (New) (NEP CBCS) Examination: March/April - 2025
Microwave Devices and Applications (2320307)

Day & Date: Monday, 19-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. (MCQ) **08**

1) The main advantage of a TWT over a klystron is:
a) Higher power capability
b) Better efficiency at low frequencies
c) Wider bandwidth
d) Simpler construction

2) The anode of a cavity magnetron is typically constructed with:
a) Resonant cavities b) A helical slow-wave structure
c) Drift tubes d) A dielectric coating

3) A dipole antenna primarily radiates:
a) In all directions equally b) In a bidirectional pattern
c) In a unidirectional pattern d) Only in the direction of the ground

4) An isotropic antenna is defined as an antenna that:
a) Radiates equally in all directions
b) Radiates only in one direction
c) Has high in one direction
d) Has a small aperture size

5) The Ridley-Watson-Hines (RWH) theory is used to analyze the operation of:
a) Traveling-wave tubes b) Gunn diodes
c) Klystron amplifiers d) Varactor diodes

6) Which of the following is true about waveguide cut-off frequency?
a) It is the maximum frequency a waveguide can operate at
b) Below it, the waveguide will not support propagation
c) It is always determined by the waveguide's length
d) It only applies to circular waveguides

7) An isolator in microwave circuits is used to:
a) Split the power equally
b) Allow power flow in one direction and block it in the reverse
c) Combine signals from two ports
d) Filter out unwanted harmonics

8) The main difference between a MESFET and JFET is that a MESFET uses:
a) A Schottky gate instead of a p-n junction gate
b) A p-n junction gate instead of a Schottky gate
c) Lower power consumption
d) A lower frequency range

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

a) Tunnel diodes can only operate in the frequency range below 1 GHz.
b) A waveguide can only carry electromagnetic waves in the form of transverse electric (TE) and transverse magnetic (TM) modes.
c) A klystron can provide amplification over a much broader frequency range compared to a TWT.
d) The primary function of an antenna is to convert electrical energy into electromagnetic waves and vice versa.

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

a) What is Isotropic Antenna?
b) What is Directional coupler.
c) Write applications of Reflex Klystrons.
d) State the formulas for coupling factor, Directivity and Isolation in Directional couplers.
e) Write applications of Reflex Klystrons.
f) Write applications of Magnetron Oscillators.
g) What is Radiation Pattern in antennas?
h) What is Isotropic Antenna?

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

a) Explain Short Dipole antennas and write its advantages and applications.
b) Explain structure and working of Gunn Diode.
c) Explain structure and working of IMPATT Diode.
d) Explain Linear Antenna Array with neat diagram.

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

a) Write a short note on Phase Shifters and its applications.
b) Explain structure and working of TRAPATT Diode.
c) Explain broadside and end fire antennas.

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

a) Explain construction and working of Travelling Wave Tube with neat labelled diagram.
b) Explain Ridley-Watkins-Hilsum-Theory.
c) Explain different types of Reflector Antennas.

Seat No.	

Set P

M.Sc. (Electronics Science) (Sem - III) (Old) (CBCS) Examination: March/April - 2025
Process Control (MSC02301)

Day & Date: Thursday, 15-May-2025 Max. Marks: 80
Time: 11:00 AM To 02:00 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.

Q.1 A) Multiple Choice Questions: **10**

1) ____ has ability to deal with multivariable process.
a) DMC b) SLPC
c) IMC d) none of the above

2) Proportional control ____ the response of a control process.
a) accelerates b) deaccelerates
c) has no effect on d) none of the above

3) The loop in a feedback system is ____ loop.
a) Open b) partial open
c) closed d) partial closed

4) Standard for hydraulic signal transmission in process control industry is ____ inches.
a) 0-5 b) 0-2
c) 1-5 d) 1-2.5

5) The transfer function for a P controller is ____.
a) $K_P + K_D S$ b) $K_P + K_I / s$
c) Kp d) $K_D s$

6) A system with transfer function [(2S/4S)+1] is of ____ order.
a) 0^{th} b) 2^{nd}
c) 1^{st} d) 5^{th}

7) Number of poles in a system with transfer function $1/(S^2 + 2S^2 + 1)$ is ____.
a) 0 b) 2
c) 1 d) 3

8) On-off controllers are normally used for ____.
a) low load b) high load
c) flow rate change d) none of the above

9) The purpose of control loop is to ____ the process variable.
a) measure b) adjust
c) monitor d) keep constant

10) Main objective of process control is to control ____ parameters.
a) optical b) mechanical
c) physical d) electrical

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

1) The bandwidth for a good control system is large.
2) PD controller can eliminate the offset.
3) SLPC full form is Single loop process converter.
4) Ziegler-Nichol's method can be used for both closed and open loop systems.
5) For a PID controller: Set Kp to approximately 0.6 * Ku.
6) Relays are commonly used in on/off control systems.

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

a) Write a short note on feedback control system.
b) Explain in short the ON/OFF controller.
c) Write a short note on smith predictor compensator.
d) Compare between SLPC and MLPC.

Q.3 Answer the following questions.

a) Explain Ziegler-Nichols tuning method for process loop tuning. **10**
b) Explain the cascade control system with a neat block diagram. **06**

Q.4 Answer the following question.

a) With a neat diagram and equations explain the only p-controller. **08**
b) Write down the Cohen-Coon tuning method steps for controller parameters. **08**

Q.5 Answer the following question.

a) With a help of diagram explain the design implementation of PI control. **10**
b) Write a short note on Inverse Response behaviour of processes. **06**

Q.6 Answer the following question.

a) Explain in details the Dead time processes and its effect on control system. **08**
b) Write short note on **08**
1) Steady state gain
2) Process gain
3) Valve gain
4) Backlash

Q.7 Answer the following

a)	Draw ANN neuron model and explain elements in the model.	**08**
b)	With a neat diagram explain the construction and working of Pneumatic controller.	**08**

Seat No.	

Set **P**

M.Sc. (Electronics Science) (Sem - III) (Old) (CBCS) Examination: March/April - 2025
Microwave Devices and Applications (MSC02302)

Day & Date: Saturday, 17-May-2025 Max. Marks: 80
Time: 11:00 AM To 02:00 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

Q.1 A) Multiple Choice Questions: **10**

1) Tunnel diode has a very fast operation in ____.
   a) gamma frequency region b) ultraviolet frequency region
   c) microwave frequency region d) radio frequency region

2) Advantage of using GaAs in MESFET as compared to use of silicon is:
   a) GaAs are cost effective
   b) they have higher mobility
   c) they have high resistance for flow of current in the reverse direction
   d) none of the mentioned

3) For n-JFET, the channel is a/an ____ channel and gates are ____.
   a) N type; P type b) P type; P type
   c) N type; N type d) P type; N type

4) The number of modes of operation for n type GaAs is:
   a) Two b) three
   c) Four d) Five

5) In a travelling-wave tube, the purpose of helix structure is ____.
   a) to make-sure broadband operation
   b) to minimise the noise figure
   c) to minimise the RF field's axial velocity
   d) none

6) For an n-channel FET, what is the direction of current flow?
   a) Source to drain b) Drain to source
   c) Gate to source d) Gate to drain

7) The Tunnel diode is also known as ____.
   a) No barrier diode b) Active area diode
   c) Esaki diode d) Bulk diode

8) In the following microwave tubes, RF energy travels at nearly the same speed as the electrons that are traveling from the cathode to the collector:
   a) Magnetron b) TWT
   c) CFA d) Klystron

9) For Gunn diodes, semiconductor material preferred is
   a) Silicon b) Germanium
   c) Gallium Arsenide d) All of these

10) LSA full form is.
   a) light space charge accumulation
   b) limited space charge accumulation
   c) light space charge atom
   d) limited space charge atom

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

a) The semiconductor layers in IMPATT diode are four.
b) Gunn diode is invented by J. B. Gunn and it consists of only N-type semiconductor.
c) IMPATT and TRAPATT diodes comes under the TEDs.
d) In TWT, purpose of attenuator is to prevent oscillations due to mismatched loads.
e) Magnetron is O-type tube.
f) Avalanche transit time devices uses both avalanche effect and transit time effect.

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

a) Compare JFET and MESFET.
b) Explain different modes of operation of microwave BJT.
c) What is HEMT? Write its applications.
d) Compare IMPATT and TRAPATT.

Q.3 Answer the following questions.

a) What is ATTDs? Explain TRAPATT principle of operation with neat diagram. **10**

b) Explain Multicavity Klystron with its schematic diagram. **06**

Q.4 Answer the following question.

a) What is the operating principle of tunnel diode? Explain the working of its in detail. **08**

b) Explain Junction Field-Effect Transistors (JFETs) with neat schematic diagram of its Physical Structure. **08**

Q.5 Answer the following question.

a)	Explain Ridley- Watkins- Hilsum theory in detail.	**10**
b)	What are the applications of Microwave BJT? Explain its different configurations.	**06**

Q.6 Answer the following question.

a)	Explain Helix TWT with its schematic diagram in detail.	**08**
b)	Explain Slow wave structures of Traveling-Wave Tubes.	**08**

Q.7 Answer the following

a)	What are the cross-field devices? Explain the working of Cylindrical Magnetron Oscillator.	**08**
b)	Derive the equation of velocity modulation in Two-cavity Klystron.	**08**

Seat No.	

Set | P

M.Sc. (Electronics Science) (Sem - IV) (New) (NEP CBCS) Examination: March/April - 2025
PLC and SCADA (2320401)

Day & Date: Wednesday, 14-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) The standard form of DCS is _____.
a) Distributed Control System
b) Digital Control System
c) Distributed Code System
d) Distributed Communication System

2) The first generation SCADA systems were developed or designed in _____.
a) 1970 b) 1960
c) 1980 d) 1990

3) A PLC would be used for the automation of industrial _____.
a) Electromechanical processes
b) Electrochemical processes
c) Recurrent process
d) Electromagnetic process

4) _____ program is used for functions as counters, timers, shift registers, and math operation in PLC.
a) HTML b) Logic function programming
c) Ladder logic d) C programming

5) _____ is the type of control in SCADA.
a) Online control b) Digital control
c) Analog control d) Supervisory control

6) _____ are the components of traditional SCADA system.
a) Remote Telemetry Unit b) Communication system
c) Central Station d) All of the above

7) _____ are the components of modem SCADA system.
a) Human Machine Interface b) SCADA servers
c) SCADA clients d) All of the above

8) The heart of the SCADA system is _____.
a) CPU b) PLC
c) I/O task d) Relays

B) Fill in the blanks or write True or false. **04**

1) TWO type of control systems are there for SCADA systems.
2) Three types of network configurations does SCADA system may use.
3) Three ways that SCADA system can get access to the cloud.
4) The supervisory control and data acquisition system Stores data Monitors data Controls data.

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

a) Write short note on fiber optic cable parameter.
b) Write a ladder program for AND gate. Draw its truth table.
c) Differentiate between SCADA and PLC.
d) Write a short note on Twisted Pair cable.
e) What is Guided media?
f) What is Unguided media?
g) What is Open loop system?
h) What is Closed loop system?

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

a) Compare MODBUS and PROFIBUS on any six points.
b) Explain PLC selection and configuration for any one process applications.
c) Write a short note on varies Connector standards.
d) Write a short note on USB Connector standards.

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

a) Explain the following guided media in short with advantages and disadvantages.
   i) Twisted Pair
   ii) Coaxial
b) List the Layers of OSI Model? Describe the Functions of Transport. Session and Application Layer.
c) Explain the functionality of RS-232 standard serial interface with neat diagram.

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

a) List the typical parts of DCS system hardware. Explain the function of workstation.
b) What is HART Protocol? Explain the overview of HART in details.
c) What is CAN Protocol? Explain it in details.

Seat No.	

Set P

M.Sc. (Electronics Science) (Sem - IV) (New) (CBCS) Examination: March/April - 2025
Integrated Circuits and VLSI (2320402)

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 correct alternative. **08**

1) A typical quiescent power dissipated of low power CMOS is _____.
a) 2 nW b) 5 nW
c) 0.5 nW d) 30 nW

2) Which circuits takes less chip area in large scale integration?
a) TTL logic circuits b) Bipolar circuits
c) CMOS circuits d) High power circuits

3) The access time of 256 MB CMOS DRAM is _____ nano seconds.
a) 1 b) 10
c) 4 d) 8

4) What is the standard form of CCD image sensor?
a) Charge Coupled Device b) Charged Common Device
c) Common Coupled Device d) None of the above

5) Choose the correct statement.
a) MOSFET is a uncontrolled device
b) MOSFET is a voltage controlled device
c) MOSFET is a current controlled device
d) MOSFET is a temperature controlled device

6) The controlling parameter in MOSFET is _____.
a) Vds b) Is
c) Vgs d) Ig

7) The switch logic approach takes _____ static current.
a) low b) more
c) no d) very less

8) Switch logic is designed using _____.
a) complementary switches b) silicon plates
c) conductors d) resistors

B) Write True/False OR Fill in the blanks. **04**

1) Basic AND and OR gate combinations are used in switch logic.
2) The mask is derived from the structural operation of masks.
3) MOSFET can be fabricated on single CHIP.
4) Operates in both modes, this is an n-channel D-MOSFET.

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

a) Define latch-up in CMOS circuits.
b) List two advantages of using cascade current mirrors.
c) Mention two differences between static and dynamic CMOS logic.
d) Write two limitations of using long-channel MOS devices.
e) Define threshold voltage in MOSFETs.
f) What is channel-length modulation in MOS transistors?
g) Define the term "stick diagram" in VLSI layout design.
h) Write two causes of clock skew in synchronous circuits.

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

a) Explain Second order effects in MOS devices.
b) Write a note on Ratioed logic.
c) Explain Common Source single stage amplifier.
d) Write Brief note on Xilinx.

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

a) Describe Cascading in Dynamic CMOS Design and Explain NORA CMOS.
b) Explain common and differential modes of Differential Amplifiers.
c) Write λ-based design rules for NMOS and CMOS circuit design.

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

a) Explain Static latches and Registers.
b) Explain MOS Structure and its working with I-V characteristics.
c) Explain the CAD tools and Hierarchical design of VLSI.

Seat No.	

Set **P**

M.Sc. (Electronics Science) (Sem - IV) (New) (NEP CBCS) Examination: March/April - 2025
Python and Machine Learning (2320405)

Day & Date: Tuesday, 20-May-2025 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

Instructions: 1) All Questions are compulsory.
2) Figures to the right indicates full marks.

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

1) Which of the following functions is a built-in function in python?
   a) Factorial () b) Print ()
   c) Seed () d) Sqrt ()

2) Which of the following statements is used to create an empty set in Python?
   a) ( ) b) [ ]
   c) { } d) Set ()

3) 53. Which of the following is a Python tuple?
   a) {1,2,3} b) { }
   c) [1,2,3] d) (1,2,3)

4) Which of the following statements create a dictionary?
   a) d = { } b) d = {“john”:40, “peter”:45}
   c) d = {40:”john”, 45:”peter”} d) All of the mentioned

What will be the output of the following Python code?

5) >>>str1= “helloworld”
   >>>str1[::-1]
   a) Dlrowolleh b) Hello
   c) World d) Helloworld

6) Which of the following is one of the key data science skills?
   a) Data Visualization b) Machine Learning
   c) Statistics d) All of the mentioned

7) Which of the following is NOT a type of machine learning?
   a) Computational learning b) Reinforcement learning
   c) Unsupervised learning d) Supervised learning

8) Which of the following is a common method for data preprocessing?
   a) Data normalization b) Data storage
   c) Data aggregation d) Data visualization

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

1) The type () function returns the data type of a given object.
2) Python uses curly braces { } to define code blocks.
3) NumPy is primarily used for numerical computations in Python.
4) Matplotlib is a Python library used for creating static, animated, and interactive visualizations.

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

a) What is the purpose of Jupyter Notebook in machine learning?
b) Define supervised learning with an example.
c) What is the difference between break and continue statements in Python?
d) How is a dictionary defined in Python? Give a simple example.
e) Describe the use of logical operators in Python with examples.
f) Define clustering and give one real-world example.
g) What does the pickle module do in Python?
h) What is the purpose of the print () function in Python?

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

a) What are the different types of data structures supported in Python? Explain with examples.
b) Explain the use of loops with an example using a for loop and a list.
c) Compare tuple and dictionary data types in Python with examples.
d) What are the benefits of using Kaggle for machine learning projects?

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

a) Write a Python program to calculate the area of a circle given its radius.
b) Describe any two unsupervised learning algorithms and show their application on datasets from Kaggle.
c) Write a Python program that takes an integer input from the user and prints whether it is positive, negative, or zero.

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

a) Explain the concept and use of ensemble models with examples from Random Forest and Gradient Boosting.
b) Explain the different arithmetic operators in Python with examples.
c) Write a Python program to calculate the simple interest. Accept principal, rate, and time from the user.

Seat No.	

Set P

M.Sc. (Electronics Science) (Sem - IV) (New/Old) (CBCS) Examination: March/April - 2025
Optical Fiber Communication (MSC02401)

Day & Date: Wednesday, 14-May-2025 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

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

1) more sophisticated structure than p-i-n photo diode.
   a) Avalanche photodiode b) p-n junction diode
   c) Zener diode d) Varactor diode

2) ____ are best suited for the study of electromagnetic wave propagation.
   a) Maxwell's equations b) Allen-Cahn equations
   c) Avrami equations d) Boltzmann's equations

3) The core of an optical fiber has a ____
   a) Lower refracted index than air
   b) Lower refractive index than the cladding
   c) Higher refractive index than the cladding
   d) Similar refractive index with the cladding

4) ____ is the first stage in liquid-phase-technique.
   a) Preparation of ultra-pure material powders
   b) Melting of material
   c) Decomposition
   d) Crystallization

5) The fraction of incident photons generated by photodiode of electrons generated collected at detector is known as ____
   a) Quantum efficiency
   b) Absorption coefficient
   c) Responsivity
   d) Angerre combination

6) Raman and Brillouin scattering are usually observed at ____
   a) Low optical power densities b) Medium optical power densities
   c) High optical power densities d) Threshold power densities

7) ____ impurity is added to gallium phosphide to make it an efficient light emitter.
   a) Silicon b) Hydrogen
   c) Nitrogen d) Oxygen

8) Data transfer in optical fiber in ____.
   a) Wire b) Wireless
   c) Light d) Water

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

10) ____ is provided by an optical receiver for the regeneration of data signal with minimum error.
   a) Photo-diode b) Signal Processing Circuits
   c) Linear Circuitry d) None of the above

B) Will in the blanks or write True or false: **06**

a) Optical fiber carries a very small amount of current.
b) Optical fiber is easy to "tap".
c) Optical fiber is easy to splice.
d) Optical fiber can be used safely in an atmosphere of explosive gas.
e) An optical fiber is a waveguide for light.
f) Optical fiber has greater loss per kilometer than copper cable.

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

a) Compare PN and PIN photodiode.
b) Write difference between SLED and ELED.
c) Difference between stimulated and spontaneous emission
d) Explain bending loss in optical fiber.

Q.3 Answer the following questions.

a) Explain types of optical fiber. **08**
b) Explain Ray theory of transmission in detail. Also define critical angle, acceptance angle, Numerical aperture. **08**

Q.4 Answer the following question.

a) Explain vapour phase deposition technique with suitable diagram. **08**
b) What is fiber splicing? Explain fusion splicing in detail. **08**

Q.5 Answer the following question.

a) Explain Semiconductor injection laser and write its characteristics. **10**
b) Explain LED power and efficiency. **06**

Q.6 Answer the following question.

a) What is the principle of optical detection? Explain quantum efficiency and responsivity of optical detector. **08**

b) When the mean optical power launched into an 8 km length of fiber is 120 μW, the mean optical power at the fiber output is 3 μW. Determine: **08**

1. the overall signal attenuation or loss in decibels through the fiber assuming there are no connectors or splices;
2. the signal attenuation per kilometer for the fiber.
3. the overall signal attenuation for a 10 km optical link using the same fiber with splices at 1 km intervals, each giving an attenuation of 1 dB;
4. the numerical input/output power ratio in (c).

Q.7 Answer the following

a) What is the main difference between semiconductor photodiode with and without internal gain? Explain PN and PIN photo diode. **10**

b) Explain fiber alignment and joint losses. **06**

Seat No.	

Set | P |

M.Sc. (Electronics Science) (Sem - IV) (New/Old) (CBCS) Examination: March/April - 2025
PLC and SCADA (MSC02403)

Day & Date: Tuesday, 20-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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

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

1) OSI stands for ____.

a) open system interconnection b) operating system interface
c) optical service implementation d) open service Internet

2) The standard form of DCS is ____.

a) Distributed Control System
b) Digital Control System
c) Distributed Code System
d) Distributed Communication System

3) USB 3.0 supports up to ____ Gbps speed.

a) 1 b) 2
c) 3 d) 5

4) ____ tasks is not done by data link layer.

a) Framing b) Error control
c) Line coding d) Flow control

5) The control in SCADA is ____ control.

a) Online b) Supervisory
c) Direct d) Automatic

6) ____ is not a guided media.

a) Copper wire b) Coaxial cable
c) Wireless LAN d) Fiber optical cable

7) The function of PLC ladder logic is to ____.
a) create and edit the control program
b) test and debug the control program
c) represent the control program in a graphical format
d) All the above

8) In CAN protocol the ID (Standard Frame Format) is of ____ bit.
a) 11 b) 12
c) 13 d) 29

9) The heart of the SCADA system is ____.
a) CPU b) I/O task
c) PLC d) Relays

10) Multimode step index fibers have a bandwidth of ____ MHz/km.
a) 2 to 30 b) 6 to 50
c) 10 to 40 d) 8 to 40

B) Will in the blanks or write True or false: **06**

1) TCP is a connection-oriented protocol.
2) C++programming language is typically used to program a PLC.
3) 100m is the max length of the Shielded twisted pair cable.
4) TCP/IP Reference Model is a 4 layered suite of communication protocols.
5) Only DC type of power supply is used for PLC.
6) SCADA is a process that uses networked data communications, graphical user interface, and computers for high-level process supervisory management.

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

a) Draw block diagram of SCADA system for chemical plant.
b) Write short note on twisted pair cable.
c) What are the advantages and disadvantages of fiber optic?
d) Differentiate between Open loop and closed loop.

Q.3 Answer the following questions.

a) What is Serial Communication? Explain briefly the RS-232 serial interface. **10**
b) Write a short note on Coaxial cables. **06**

Q.4 Answer the following question.

a) What are the primary components of a CAN bus network? Explain CAN protocol in detail with necessary diagram. **08**
b) Describe in short the various Connector standards used in automation. **08**

Q.5 Answer the following question.

a) List the Layers of OSI Model? Describe the Functions of each Layer in short. **08**

b) Write a short note on varies Connector standards. **08**

Q.6 Answer the following question.

a) Draw the PLC logic for following gates. **10**
i)AND ii) NOT iii) NOR iv) XOR v) NAND

b) Explain how SCADA is implemented in water purification system. **06**

Q.7 Answer the following

a) What is HART Protocol? Explain the overview of HART in details. **10**

b) Compare MODBUS and PROFIBUS on any six points. **06**