

**FOURTH SEMESTER M.Sc. DEGREE (REGULAR) EXAMINATION
MARCH 2021**

(CBCSS)

Electronics

ELS 4E 03 D—MICROWAVE ELECTRONICS

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend all questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Part A*Answer any four questions.**2 weightage each.*

1. **What are microwaves? List any two advantages of microwaves.**
2. **“TEM wave cannot exist inside a waveguide” Justify the statement.**
3. **Define guide wavelength.**
4. **What are standing waves ?**
5. **What is Gunn effect ?**
6. **What factors determine antenna gain ?**
7. **What is EIRP ?**

(4 × 2 = 8 weightage)

Part B*Answer any four questions.**3 weightage each.*

8. **What are waveguides? Explain different types of waveguide.**
9. **Explain the characteristics of magic Tee.**

10. What is Smith chart ? What are its applications ?
11. With necessary schematic diagram, explain coaxial lines.
12. Explain the construction and operation of BARITT diode.
13. Explain the radiation mechanism of antenna.
14. Write explanatory notes on Vector Network Analyzer.

(4 × 3 = 12 weightage)

Part C

*Answer any two questions.
5 weightage each.*

15. What are TE, TM and TEM modes of propagation ? Sketch the field patterns for dominant mode in a rectangular waveguide and explain its properties.
16. Explain VSWR. Obtain the expression for the VSWR(S) of a transmission line in terms of its reflection coefficient (ρ). What are the ideal values of ρ and S ?
17. Using energy band diagrams, explain the characteristics of tunnel diode. Discuss the applications also.
18. What are the functions of antenna? Explain in detail about :
 - (a) Microstrip antenna.
 - (b) Array antenna.

(2 × 5 = 10 weightage)

**FOURTH SEMESTER M.Sc. DEGREE (REGULAR) EXAMINATION
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ELS 4E 03C—NEURAL NETWORKS AND APPLICATIONS

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

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Part A

Answer any four questions.

2 weightage each.

1. Write note on applications of neural networks.
2. What do you mean by unsupervised learning ?
3. Draw the architecture of auto associative memory network.
4. Describe the concept of simulated annealing.
5. Explain the main components in an ART network.
6. Discuss the importance of Kohonen network self-organizing map.
7. Explain various types of cells associated with neocognitron ?

(2 × 4 = 8 weightage)

Part B

Answer any four questions.

3 weightage each.

8. Differentiate between single layer and multilayer feed forwards networks.
9. Realize NOT function using McCulloch Pitts neuron model.

Turn over

10. Explain the testing algorithm for a discrete Hopfield network.
11. Write the training algorithm for a forward-only CPN.
12. Explain Boltzmann input- output network architecture.
13. Explain the overall structure of ART 2 network.
14. Describe the concept of avalanche network for single word recognition.

(4 × 3 = 12 weightage)

Part C

Answer any two questions.

5 weightage each.

15. Discuss the concepts of ADALINE and the adaptive linear combiner (ALC).
16. Describe back propagation algorithm with flow chart.
17. Explain the architectures of a popular self-organizing map and discuss the steps involved in its algorithm.
18. With schematic representation discuss the interconnection strategy of the neocognitron.

(2 × 5 = 10 weightage)

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ELS 4E 03 A—MEMS AND NEMS

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Section A*Answer any four questions.**2 weightage each.*

1. Define MEMS with a neat block diagram.
2. Explain MEMS node.
3. What are longitudinal and transverse gauge factor ?
4. Differentiate between MEMS and NEMS.
5. Explain thermal bimorph principle.
6. What are micro actuators ?
7. Define High Aspect Ratio technology.

(4 × 2 = 8 weightage)

Section B*Answer any four questions.**3 weightage each.*

8. Briefly explain the design of high performance nano or micro scale mechanism.
9. Classify and explain electromechanical system.
10. What are piezo resistive sensors ?

11. Explain LIGA fabrication technology.
12. Explain about isotropic and anisotropic etching ?
13. Explain about Schrödinger equation.
14. Explain density functional theory.

(4 × 3 = 12 weightage)

Section C

*Answer any two questions.
5 weightage each.*

15. Explain micro system fabrication process.
16. Briefly discuss about electrostatic sensors and actuators.
17. Briefly describe the design of acoustic wave sensors.
18. Explain the applications of micro and nano scale sensors.

(2 × 5 = 10 weightage)

**FOURTH SEMESTER M.Sc. DEGREE (REGULAR) EXAMINATION
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ELS 4E 02D—VERILOG PROGRAMMING

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Part A*Answer any four questions.**2 weightage each.*

1. Explain body effect in MOSFETs.
2. Explain Basic DC equations.
3. Describe continuous assignment statement with syntax.
4. Explain the basic components of a Verilog module with example.
5. Write the Verilog code for the half adder.
6. Write a short note on layout design rules.
7. Explain blocking and non blocking statements.

(4 × 2 = 8 weightage)

Part B*Answer any four questions.**3 weightage each.*

8. Explain the structure of MOS Transistor.
9. Explain about Latch-up and its prevention.

Turn over

10. Write the Verilog code to implement a JK flip-flop.
11. Explain about different types of hazards.
12. Write Verilog code to implement basic gates.
13. Explain MOS capacitance model.
14. Explain about DC Transfer characteristics of CMOS inverter.

(4 × 3 = 12 weightage)

Part C

*Answer any two questions.
5 weightage each.*

15. Write Verilog code to implement 8-to-1 multiplexer using 4-to-1 multiplexer.
16. Explain implementation of universal gates using cmos transistors.
17. Write Verilog code and its testbench to implement 4 bit up counter ?
18. Write Verilog code to implement 4 bit full adder with carry look ahead logic.

(2 × 5 = 10 weightage)

**FOURTH SEMESTER M.Sc. DEGREE (REGULAR) EXAMINATION
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ELS 4E 02 B—DIGITAL IMAGE PROCESSING

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Maximum : 30 Weightage

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Part A*Answer any four questions.**Each question carries 2 weightage.*

1. What are the various levels of image processing ?
2. Define : Spatial and Gray-level resolution.
3. Define 4-adjacency, 8-adjacency and m-adjacency of a pixel.
4. What is Haar transform ? Give the Haar transform matrix corresponding to $N = 2$ and $N = 4$.
5. What are the various common noises associated with a digital image ? Give the basic mathematical formulation for each.
6. What are the basic operations involved in geometric transformation ? Explain briefly.
7. What is the basic idea involved in minimum distance classifier ?

(4 × 2 = 8 weightage)

Part B*Answer any four questions.**Each question carries 3 weightage.*

8. Explain the main components of an image processing system.
9. Explain briefly the human visual perception with reference to the sensory elements.

Turn over

10. Compare the global and local histogram processing methods used in image enhancement.
11. Compare DFT and DCT.
12. What is inverse filtering ? Explain how an inverse filter is designed.
13. Explain how image gradient is used to find the edges in an image.
14. Briefly explain the back propagation ANN.

(4 × 3 = 12 weightage)

Part C

*Answer any two questions.
Each question carries 5 weightage.*

15. Describe the various sensors used in image acquisition.
16. Explain DCT and its properties. How DCT is used in image processing ?
17. What is an image histogram ? Explain the various histogram processing techniques for image enhancement.
18. Explain how edge linking can be done using Hough transform.

(2 × 5 = 10 weightage)

**FOURTH SEMESTER M.Sc. DEGREE (REGULAR) EXAMINATION
MARCH 2021****(CBCSS)****Electronics****ELS 4C 12—ROBOTICS****(2019 Admissions)****Time : Three Hours****Maximum : 30 Weightage****General Instructions**

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Part A*Answer any four questions.**2 weightage each.*

1. Define degrees of freedom.
2. List out different robot programming languages.
3. Differentiate forward and inverse kinematics.
4. Differentiate servo controlled robot and non-servo controlled robot.
5. What do you mean by homogeneous transformation ?
6. Explain the principle of edge detection.
7. Discuss the working principle of range sensors

(2 × 4 = 8 weightage)**Part B***Answer any four questions.**3 weightage each.*

8. Explain the steps involved in Trajectory planning.
9. What is joint coordinates ?

10. Explain application of pattern recognition in robotic vision.
11. Give a brief explanation of robot applications
12. Explain : (a) Mobile robots ; and (b) Micro robots.
13. What are the different actuators used in the robots ? Describe them briefly.
14. Define and explain a geometric Jacobian.

(3 × 4 = 12 weightage)

Part C

*Answer any two questions.
5 weightage each.*

15. Describe the types of gripper mechanisms with simple sketches .
16. Explain the components and structure of a robot arm.
17. What are the uses of sensors in robot? Give examples and explain any one in detail.
18. Explain how image segmentation helps to improve the quality of an image in machine vision system.

(5 × 2 = 10 weightage)