S–6532

Sub. Code
23MEL1C2

M.Sc. DEGREE EXAMINATION, APRIL 2025

First Semester

Electronics

DIGITAL COMMUNICATION SYSTEMS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is entropy encoding theory?
2. Write any two difference between Shannon-Fano and Huffman codes.
3. How many bits transmitted per six samples in DPCM?
4. Give the mathematical representation of differential Manchester binary code.
5. Tell the formula of Nyquist criterion.
6. Quote the any two-eye pattern idea.
7. Define power spectral density.
8. List out the QAM applications.
9. State the channel coding theorem.
10. Give any one method used for representing convolutional encoder.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Clarify the characteristics of mutual information.

Or

(b) State and express the Shannon theorem.

12. (a) Draw and explain the functional block diagram of ADPCM transmitter.

Or

(b) Determine the working principles of polar NRZ coding with pulse waveform.

13. (a) Illustrate the pulse shaping method and draw its waveform.

Or

(b) Distinguish between receiving and matched filter.

14. (a) Designate the in detail about QPSK generation.

Or

(b) Discover the physical characteristics of carrier synchronization.

15. (a) Summarize the linear block code advantages.

Or

(b) Explain the hamming codes with suitable examples.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. State the source coding theorem and proof for symbol codes methods.

17. Compare the polar RZ, NRZ and bipolar NRZ codes.

18. Briefly explain the Adaptive equalization generation.

19. Why need of quantization and explain the QAM modulation technique with neat diagram.

20. Design and implement the Viterbi algorithm used to digital communication.

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S–6537

Sub. Code
23MEL2C1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Electronics

EMBEDDED SYSTEM DESIGN WITH AVR

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What are general-purpose registers in the AVR microcontroller?

2. Define the function of the status register in the AVR.

3. What are I/O ports in the AVR microcontroller?

4. Define port registers in the context of AVR microcontrollers

5. Define counter in the context of AVR.

6. What is an interrupt in AVR microcontrollers?

7. What is serial communication in the context of AVR microcontrollers?

8. Define the RS232 standard in serial communication.

9. What is the SPI bus protocol in AVR microcontrollers?

10. Define the I^2C bus protocol.

Part B $(5 \times 5 = 25)$

Answer **all** questions choosing either (a) or (b).

11. (a) Describe how to perform I/O programming in C using AVR microcontrollers.

Or

(b) Explain the process of generating a hex file for AVR microcontrollers.

12. (a) Discuss the steps involved in interfacing a 7-segment display with the AVR microcontroller.

Or

(b) Explain the interfacing of a stepper motor with the AVR microcontroller.

13. (a) Describe the PWM modes available in Timer 1 of the AVR microcontroller.

Or

(b) Explain the wave generation using Timer 1 in AVR microcontrollers.

14. (a) Describe the SPI protocol and its application in AVR microcontrollers.

Or

(b) Explain the I^2C protocol and its importance in AVR microcontroller communication.

15. (a) Describe the interfacing of a sensor with the AVR microcontroller.

Or

(b) Explain the process of interfacing a DS1307 RTC with AVR microcontrollers.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss the role of Embedded C programming in AVR microcontrollers, covering topics such as data types, control flow and memory allocation.

17. Explain the interfacing of 16 × 2 LCD with AVR microcontrollers with c programming code.

18. Describe the role of PWM in AVR microcontrollers, focusing on its modes and applications in embedded systems.

19. Describe the AVR Serial Port Programming in C using Interrupts SPI.

20. Explain the ADC interfacing with AVR microcontroller.

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S–6538

Sub. Code
23MEL2C2

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Electronics

CMOS VLSI DESIGN

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is functional simulation in VLSI design?

2. What does fusing" refer to in chip fabrication?

3. What is the significance of layout design rules in CMOS technology?

4. What are CMOS process enhancements?

5. Explain the term "scaling' in VLSI technology.

6. Define reliability in the context of VLSI circuits

7. Define boundary scan in design for testability.

8. What is the role of flip-flops in sequential circuit design?

9. What are structural primitives in HDL?

10. What is a test bench in the context of HDL?

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Describe the CMOS fabrication process, including the role of layout design rules.

Or

(b) Explain the VLSI design flow from design specification to chip fabrication.

12. (a) Discuss the ideal and non-ideal I-V characteristics of MOS transistors.

Or

(b) Explain the DC characteristics of a CMOS inverter and their importance.

13. (a) Discuss the methods used for delay estimation in CMOS circuits.

Or

(b) Explain power dissipation in CMOS circuits and how it can be minimized.

14. (a) Describe the design principles of static and dynamic CMOS circuits.

Or

(b) Explain the importance of low-power logic design in CMOS circuits.

15. (a) Discuss the role of behavioral modeling with continuous assignments in HDL.

Or

(b) Explain the use of always blocks in HDL for sequential circuit design.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Discuss the entire VLSI design flow, from design specification and entry to functional simulation, placement, routing, and chip fabrication.

17. Describe the CMOS technologies, including layout design rules, process enhancements, and their significance in modern VLSI design.

18. Discuss the technology-related CAD issues and manufacturing challenges in VLSI design

19. Explain the principles and methods of CMOS testing, including logic verification, silicon debugging, manufacturing tests, and boundary scan techniques.

20. Describe the process of designing, simulating, and testing digital circuits using HDL, including the use of test benches and structural primitives.

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S–6539

Sub. Code
23MEL2E1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Electronics

Elective : DIGITAL SIGNAL PROCESSOR PROGRAMMING AND APPLICATIONS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What are A/D conversion errors?

2. What is the purpose of a compensating filter?

3. What is parallelism in DSP architecture?

4. Define pipelining in DSP architecture.

5. What are on-chip peripherals?

6. What is the role of external bus interfacing signals?

7. What are interrupts in DSP systems?

8. Define DMA operation.

9. Define memory allocation in DSP systems.

10. What is a C/C++ compiler?

Part B

$(5 \times 5 = 25)$

Answer **all** questions choosing either (a) or (b).

11. (a) Discuss the role of dynamic range and precision in DSP systems.

Or

(b) Describe how A/D conversion errors can be compensated for in DSP systems.

12. (a) Discuss the role of the address generation unit and program control in DSP devices.

Or

(b) Explain the features of DSP devices that support external interfacing.

13. (a) Discuss the instruction sets and their significance in the programming of the TMS320C54XXDSP processor.

Or

(b) Explain the pipeline memory space organization and its impact on processor performance.

14. (a) Discuss the operation of the McBSP and its programming in DSP systems.

Or

(b) Explain the function of a CODEC interface circuit in DSP systems.

15. (a) Discuss the process of memory allocation in DSP systems and its significance.

Or

(b) Explain the implementation of FIR filters in DSP systems, with an example.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Provide a detailed explanation of digital filters, including the types of errors encountered in DSP systems and methods for compensating these errors.

17. Provide a detailed explanation of the architecture of programmable DSP devices, focusing on computational building blocks, bus architecture, and memory addressing.

18. Provide a detailed explanation of the architecture of the TMS320C54XX DSP processor, focusing on the bus structure, CPU, memory organization, and instruction sets.

19. Provide a detailed explanation of interfacing memory and parallel I/O devices in DSP systems, including memory access, wait states, and programmed I/O.

20. Provide a detailed explanation of DSP development systems, focusing on the tools, design kits, and software used in the development process.

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S–6541

Sub. Code
23MEL2E3

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Electronics

Elective – ARTIFICIAL INTELLIGENCE : MACHINE AND DEEP LEARNING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. What is machine learning?
2. What is the role of datasets in machine learning?
3. Define K-means clustering.
4. What is the purpose of logistic regression?
5. What is a deep neural network?
6. What is the significance of the multilayer perceptron?
7. What does ReLU stand for in neural networks?
8. Define the sigmoid activation function.
9. What is image segmentation?
10. Define deep learning with TensorFlow.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the differences between supervised, unsupervised and semi-supervised learning.

Or

(b) Discuss the importance of datasets in machine learning and provide examples.

12. (a) Explain the working principle of linear regression and its application in machine learning.

Or

(b) Discuss the key differences between logistic regression and decision trees in classification tasks.

13. (a) Compare and contrast deep learning and machine learning.

Or

(b) Explain the working of a deep neural network.

14. (a) Explain the structure of a neural network.

Or

(b) Discuss the significance of activation functions in neural networks.

15. (a) Describe the architecture and applications of Convolutional Neural Networks (CNNs).

Or

(b) Explain the working of Recurrent Neural Networks (RNNs).

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss the process of gathering datasets for machine learning, including the challenges associated with structured and unstructured datasets.

17. Describe the differences between supervised and unsupervised learning algorithms, with examples of K-means clustering, PCA and KNN.

18. Explain the structure and functioning of deep neural networks.

19. Discuss the role and importance of different activation functions (sigmoid, tanh, ReLU) in neural networks.

20. Discuss the use of deep learning frameworks like TensorFlow in developing and deploying neural networks.

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S–6543

Sub. Code
23MEL2S1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Electronics

DATA SCIENCE FOR RESEARCH WITH PYTHON

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is meant by "rectangular data" in exploratory data analysis?

2. Define "estimates of location" in statistical terms.

3. What is the bootstrap method?

4. What is a confidence interval?

5. What is a p-value in hypothesis testing?

6. Explain the purpose of a t-test.

7. What is data pre-processing?

8. Define data transformation.

9. What is the purpose of the confusion matrix?

10. Define precision in the context of classification models

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the process of exploring the distribution of binary data.

Or

(b) What methods can be used to explore the relationship between two variables?

12. (a) How are confidence intervals used in statistical analysis?

Or

(b) Compare and contrast the normal distribution with the t-distribution.

13. (a) Compare and contrast t-tests and ANOVA.

Or

(b) Describe the chi-square test and its applications.

14. (a) Discuss the importance of data cleaning in ensuring data quality.

Or

(b) Explain how data integration is achieved in data analysis.

15. (a) Explain how the confusion matrix is used to evaluate classification models.

Or

(b) Discuss the importance of precision, recall, and F1 score in evaluating machine learning models.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain the concept of correlation and how it is used to explore relationships between multiple variables.

17. Describe the different types of sampling distributions and explain their significance in data analysis.

18. Describe the process of hypothesis testing, including the calculation and interpretation of p-values.

19. Describe the process of data pre-processing, including the key steps of data cleaning, transformation, and integration.

20. Discuss the different techniques used for dimensionality reduction and their importance in improving the performance of machine learning models.

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S–6544

Sub. Code
23MEL3C1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Third Semester

Electronics

EMBEDDED SYSTEM DESIGN WITH ARM

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Name two applications of ARM processors.

2. Define the term "On-Chip Flash Program Memory."

3. What is the function of the Crystal Oscillator in LPC2 148?

4. Define the role of the PLL (Phase-Locked Loop) in the ARM7 microcontroller.

5. What is the purpose of the General-Purpose Timer in LPC2148?

6. Define the function of external event counters in ARM7.

7. Define the SPI port operation in LPC2148.

8. What is the purpose of the Watchdog Timer in ARM7 microcontrollers?

9. Define the process of interfacing switches with the ARM7 microcontroller.

10. What is the role of keypads in digital input interfacing?

Part B $(5 \times 5 = 25)$

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the importance of On-Chip Static RAM in ARM7 microcontrollers.

Or

(b) Describe the significance of the pin diagram in the LPC2148 microcontroller.

12. (a) Discuss the importance of the VPB Memory Map in the ARM7 microcontroller.

Or

(b) Describe the power control features in LPC2148.

13. (a) Explain the role of USB hardware and software in the LPC2148 microcontroller.

Or

(b) Discuss the importance of interrupts in ARM7 microcontrollers.

14. (a) Discuss the role of Pulse Width Modulation (PWM) in the ARM7 microcontroller.

Or

(b) Describe the interfacing of the 'C Bus Serial I/O Controller with external devices.

15. (a) Discuss the role and interfacing of relays and optocouplers in LPC2148.

Or

(b) Describe the steps involved in interfacing a stepper motor with the ARM7 microcontroller.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss the ARM7 microcontroller architecture, including its features, block diagram and applications.

17. Explain the system control, memory map and GPIO functionalities in the LPC2148 ARM7 microcontroller.

18. Describe the features and operation of UART in ARM7 serial communication.

19. Describe the operation and interfacing of the Real-Time Clock (RTC) in LPC2148.

20. Describe the interfacing of a seven-segment display with the LPC2148 microcontroller.

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S–6545

Sub. Code
23MEL3C2

M.Sc. DEGREE EXAMINATION, APRIL 2025

Third Semester

Electronics

MOBILE SATELLITE COMMUNICATION SYSTEMS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What are the conditions required for mobile communication?

2. What is the difference between a geosynchronous and a geostationary satellite?

3. What is the footprint? What does it depend upon?

4. What is an eclipse of the satellite?

5. Define back off in a power amplifier.

6. What are the major shortcomings of the present-day VAST system?

7. Compare LEO, GEO and MEO satellites.

8. Name some mobile satellite systems.

9. What are the advantages and disadvantages of forward error correction?

10. A satellite is orbiting in the equatorial plane with a period from perigee to perigee of 12 hours. Given that the eccentricity is 0.002, calculate the semi major axis. The earth's equatorial radius is 6378.1414 Km.

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Discuss with satellite system architecture in detail.

Or

(b) Explain the radio frequency environment in detail.

12. (a) Describe the operation of a satellite constellation with a neat block diagram.

Or

(b) Explain in detail the regional coverage.

13. (a) Discuss the land mobile channel with a neat diagram.

Or

(b) Explain in detail the architecture of TCM.

14. (a) Briefly explain the Antenna system component.

Or

(b) Explain the operation of satellite radio interfacing standards.

15. (a) Explain the overview of the radio receiver types.

Or

(b) Briefly explain the multimedia service explain operation in detail.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Describe in detail the concept of radio link reliability with an example.

17. Explain the polar constellations in a neat block diagram.

18. Discuss briefly the automatic repeat request in detail.

19. With neat block satellite for MSS explain in detail.

20. Briefly explain the operation of OSI architecture in a broadcast context.

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S–6546

Sub. Code
23MEL3C3

M.Sc. DEGREE EXAMINATION, APRIL 2025

Third Semester

Electronics

DIGITAL IMAGE PROCESSING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Name the components of a digital image processing system.
2. What is image digitization?
3. Define Gaussian LPF.
4. What is Butterworth filtering?
5. What are histogram-based features?
6. Define texture features in image segmentation
7. What is the structuring element in morphological operations?
8. Define morphological opening and closing.
9. What is lossy compression?
10. What are neural networks used for in image compression?

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Discuss the differences between binary, grayscale, and color images.

Or

(b) What is the role of histogram equalization in image processing?

12. (a) Explain the process and purpose of spatial domain filtering in image enhancement.

Or

(b) Describe the difference between Ideal, Gaussian, and Butterworth low pass filters.

13. (a) Discuss the role of region growing in segmentation.

Or

(b) Describe the different types of boundary descriptors used in image segmentation.

14. (a) Discuss the role of dilation and erosion in morphological image processing.

Or

(b) How is the Laplacian of Gaussian used in edge detection?

15. (a) Compare lossy and lossless compression techniques.

Or

(b) Discuss the role of vector quantization in image compression.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Describe gray-level transformations and their importance in image processing, with examples of different types.

17. Discuss the different types of frequency domain filters, their mathematical formulations, and their effects on image enhancement.

18. Explain the importance of boundary and texture features in image representation and their use in different applications.

19. Discuss the fundamental concepts of morphological image processing, including the operations of dilation, erosion, opening, and closing, with real-world applications.

20. Discuss the JPEG compression standard in detail, including the steps involved in the compression process and the advantages it offers over other methods.

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S–6547

Sub. Code
23MEL3E1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Third Semester

Electronics

Elective – INTERNET OF THINGS WITH RASPBERRY Pi

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions

1. What is the Internet of Things (IoT)?
2. List any two IoT enabling technologies.
3. What is M2M high-level ETSI architecture?
4. What is an IoT reference model?
5. Define M2M protocols.
6. What is SCADA in the context of IoT?
7. Define the working principle of sensors.
8. What are the challenges in IoT design?
9. Define the term ‘relay” in the context of IoT.
10. What are analog sensors?

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the difference between physical design and logical design in IoT.

Or

(b) Describe the IoT Levels and Deployment Templates.

12. (a) Describe the M2M high-level ETSI architecture.

Or

(b) Discuss the OGC architecture in the context of IoT.

13. (a) Describe the role of WSN protocols in IoT.

Or

(b) Discuss the importance of RFID protocols in IoT.

14. (a) Explain the classification of sensors used in IoT.

Or

(b) Explain the process of running a program on Raspberry Pi.

15. (a) Explain the process of interfacing a relay with Raspberry Pi.

Or

(b) Discuss the importance of the Pi camera in IoT applications.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Describe the design methodology for IoT platforms.

17. Explain how the communication model integrates with other models in IoT architecture.

18. Describe the process of protocol standardization for IoT.

19. Explain the basics of Raspberry Pi and its importance in IoT projects.

20. Discuss the process of interfacing various sensors with Raspberry Pi and connecting to the cloud.

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S–6550

Sub. Code
23MEL3S1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Third Semester

Electronics

RESEARCH METHODOLOGY FOR SCIENTIFIC RESEARCH

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define research.

2. Name two types of research.

3. What is research validity?

4. What does “artifact” mean in the context of research?

5. What is the scientific method?

6. What is data collection?

7. What is a literature review?

8. What is a citation index?

9. Define “bibliography.”

10. What is a footnote?

Part B

$(5 \times 5 = 25)$

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the importance of research activities in scientific work.

Or

(b) Discuss the principles of quality research work.

12. (a) Explain the importance of planning and designing research.

Or

(b) Discuss the guidelines for developing research skills and awareness.

13. (a) Explain the steps involved in hypothesis testing.

Or

(b) Discuss the need for data collection in research.

14. (a) Discuss the significance of the Journal Impact Factor (JIF).

Or

(b) Describe the process of organizing a seminar.

15. (a) Explain the format of a thesis.

Or

(b) What are common errors in scientific writing?

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss the role of the scientific community in the development of research.

17. Explain the challenges in maintaining research validity and reliability.

18. Describe the importance of the scientific method in conducting research.

19. Evaluate the importance of a well-conducted literature review in research.

20. Discuss the importance of a well-structured thesis in scientific research.

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S–6551

Sub. Code
23MEL4C1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Fourth Semester

Electronics

NANOELECTRONICS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. What is nanoelectronics?

2. Define the top-down approach in nanoelectronics.

3. Define bonding in crystals.

4. What is an indirect band gap semiconductor?

5. Define epitaxial growth.

6. What is molecular beam epitaxy?

7. What is electron transport in semiconductors?

8. What is a quantum well?

9. What is a resonant-tunneling diode?

10. Define a field-effect transistor (FET).

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Describe the bottom-up approach in nanoelectronics.

Or

(b) Explain the role of operators in quantum mechanics.

12. (a) Explain the difference between direct and indirect band gaps in semiconductors.

Or

(b) Describe the structure and properties of semiconductor alloys.

13. (a) Explain the principles of epitaxial growth in nanofabrication.

Or

(b) Discuss the method of molecular beam epitaxy and its applications

14. (a) Discuss the time and length scales of electrons in solids.

Or

(b) Explain the density of states for electrons in nanostructures.

15. (a) Describe the working principle of a resonant-tunneling diode.

Or

(b) Explain the structure and function of a Field-Effect Transistor (FET).

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Describe the time-independent Schrodinger equation and its applications.

17. Discuss the properties and applications of organic semiconductors.

18. Explain the chemical vapor deposition technique for nanostructures.

19. Describe the behavior of electrons in quantum dots.

20. Discuss the applications of quantum-dot lasers in nanoelectronics.

S–6552

Sub. Code
23MEL4C2

M.Sc. DEGREE EXAMINATION, APRIL 2025

Fourth Semester

Electronics

WIRELESS COMMUNICATION SYSTEMS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** Questions

1. Give the uses of routing in wireless networks.

2. Define cell splitting.

3. Give the features of Spread Spectrum.

4. List out the services of WSP.

5. What are the factors influencing small-scale fading?

6. Name some of the outdoor propagation models.

7. List out the mobility characteristics of Ad-hoc networks.

8. Give the schematic representation of IEEE protocol layers compared to the OSI model.

9. What is Doppler spread?

10. Define DAMA-FDMA.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Write a short note on 2G cellular networks.

Or

(b) Explain the details about WLAN.

12. (a) Explain the trucking and grade service of wireless communication.

Or

(b) Discuss in detail the various types of Handoff processes available.

13. (a) Summarize the three basic propagation mechanisms.

Or

(b) Explain in detail the indoor propagation model.

14. (a) Explain briefly about the small-scale multipath propagation model.

Or

(b) Write a short note theory of multipath shape factors.

15. (a) Explain in detail the hybrid speed spectrum.

Or

(b) Write a short note on radio packets.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss the four basic layers of the Bluetooth protocol stack diagram.

17. Describe the system design fundamentals of communications.

18. Briefly explain the ground reflection model.

19. Explain different parameters of multipath channel.

20. Discuss message transmission by TDMA and FDMA.

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S–6553

Sub. Code
23MEL4E1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Fourth Semester

Electronics

Elective – BIOMEDICAL SIGNAL AND IMAGE PROCESSING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is the purpose of ECG electrode placement?

2. What is the time-domain analysis of ECG?

3. Explain the role of adaptive filtering in EEG signal preprocessing.

4. What does FFT stand for in EEG signal processing?

5. What is a Gobar filter used for in image processing?

6. Define BLOB (binary large object) analysis.

7. Define erosion in the context of MRI image processing.

8. What is the significance of image segmentation in MRI?

9. What are the advantages of fingerprint biometrics?

10. What are the disadvantages of fingerprint biometrics?

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Discuss the frequency domain analysis of ECG signals.

Or

(b) Describe wavelet domain analysis and its significance in ECG processing.

12. (a) Discuss the role of FFT in EEG signal extraction.

Or

(b) What are the key characteristics of EEG signals?

13. (a) Discuss the use of Prewitt edge detection in brain CT-scan images.

Or

(b) What is the purpose of Gobar filters in detecting regions of interest?

14. (a) Discuss the bounding box method for tumor detection in MRI images.

Or

(b) What are the key parameters used to define a bounding box in MRI image processing?

15. (a) Discuss the role of histogram equalization in fingerprint image enhancement.

Or

(b) What is the significance of Fourier Transform in fingerprint image enhancement?

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Describe the process of feature extraction from an ECG signal and its significance in medical diagnosis.

17. Explain the significance of Brain-Computer Interface (BCI) and how EEG signals are utilized in BCI systems.

18. Discuss the complete process of preprocessing and feature extraction in brain CT-scan images.

19. Explain the complete process of image segmentation in MRI, including the role of morphological operations.

20. Discuss the advantages and disadvantages of fingerprint biometrics in security systems.

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S–6554

Sub. Code
23MEL4S1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Fourth Semester

Electronics

BIOMEDICAL SENSORS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions

1. What is a biomedical sensor?

2. Define biocompatibility in the context of sensors.

3. What is a resistance sensor?

4. What is a capacitive sensor used for?

5. What is a chemical sensor?

6. What is the role of gas sensors in biomedical measurement?

7. What is a digital transducer?

8. Define incremental optical encoders.

9. What are MEMS sensors?

10. What is the role of MEMS in biomedical applications?

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the basic concept of sensors in biomedical applications.

Or

(b) Discuss the terminology associated with sensor characteristics.

12. (a) Describe the working principle of resistance sensors in biomedical applications.

Or

(b) Explain the role of photoelectric sensors in biomedical technology.

13. (a) Describe the classification and principle of chemical sensors.

Or

(b) Discuss the role of sensor networks in chemical sensing.

14. (a) Describe the advantages of digital transducers over analog transducers.

Or

(b) Explain the role of image sensors in digital cameras and image acquisition systems.

15. (a) Describe the materials used in MEMS fabrication.

Or

(b) Discuss the process of energy management in WSN.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Discuss the significance of biocompatibility and sensor characteristics in biomedical measurement technology.

17. Explain the significance of thermoelectric and piezoelectric sensors in biomedical measurement systems.

18. Explain the concept of intelligent chemical sensor arrays and their role in biomedical applications.

19. Describe the role of optical encoders and Hall-effect sensors in digital measurement systems.

20. Explain the architecture and advantages of Wireless Sensor Networks (WSN).

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