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# M.Sc. (BIOMEDICAL INSTRUMENTATION) DEGREE EXAMINATION SEPTEMBER 2026

## Fourth Semester

BIOSIGNAL PROCESSING

(2024 Admission - Regular / 2022-23 Admissions- Supplementary / 2021 Admission - First Mercy Chance / 2020 Admission - Second Mercy Chance / 2019 Admission - Final Mercy Chance)

Time : Three Hours | Maximum Marks : 100

## Part A

*Answer any* **ten** *questions.*
*Each question carries 10 marks*

1. (a) State and prove theorems in Z- transform. (5)

   (b) Find the Z- transform of $x(n)=\{1,0,2,0,3\}$. (5)

2. Determine the inverse z-transform of :

$$F(z)=\frac{5-\frac{2}{z}+1z^2}{\left(1+\frac{1}{z}\right)^2\left(1-\frac{1}{z}\right)^2}, \text{ROC}:|Z|>1 \quad . \tag{10}$$

3. Find the convolution of the following sequences

   (i) $x(n)=u(n)\ h(n)=u(n-3)$ (ii) $x(n)=\{1,2,-1,1\}\ h(n)=\{1,0,1,1\}$ (10)

4. (a) Explain the properties of the Discrete Fourier Transform (DFT). (5)

   (b) Differentiate between Linear Convolution, Circular Convolution and Block Convolution. (5)

5. Compute the circular convolution of the following sequence and compare it with linear convolution :

$x(n)=\{1,1,-1,-1\}; h(n)=\{4,3,2,1\}$ (10)

6. Explain the block diagram and steps involved in computing the FFT using Decimation in Frequency (DIF). (10)

7. (a) Discuss on bilinear transformation method. (5)

   (b) Write a brief account on the realization methods of IIR filters. (5)

8. (a) Find the lattice structure implementation of FIR filter $h[n] = \{1, 0.5, 0.75. - 0.6\}$. (5)

   (b) List the advantages and disadvantages of FIR filters. (5)

9. Write down the transfer function H (*s*) of a 3rd order Chebyshev low pass filter and cut-off frequency of 1 rad/sec. Determine H(z) by using approximation of derivative method with a sampling interval of 1 sec. (10)

10. (a) Explain the role of DSP techniques in the evaluation of ECG signals. (5)

    (b) What is Limit-cycle oscillations? Discuss their significance in IIR and FIR filters. (5)

11. Design an FIR low pass digital filter using the frequency sampling method for the following specifications:

    Cut off frequency = 1500 Hz, Sampling frequency = 15000Hz, Order of the filter N = 10, Filter Length required L = N + 1 = 11. (10)

12. Write notes on finite word length effects in FIR and IIR filters with suitable examples. (10)

(10 × 10 = 100)

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# M.Sc. (BIOMEDICAL INSTRUMENTATION) DEGREE EXAMINATION SEPTEMBER 2026

## Fourth Semester

MEDICAL INFORMATICS

(2024 Admission - Regular / 2022-23 Admission - Supplementary / 2021 Admission - First Mercy Chance / 2020 Admission - Second Mercy Chance / 2019 Admission - Final Mercy Chance)

Time : Three Hours Maximum Marks : 100

## Section A

*Answer any* **five** *questions.*

*Each question carries 10 marks .*

1. What is Medical informatics ? Explain Hospital Management and Information System. Discuss the functional capabilities of HIS.
2. Explain the components and functionality of computerised patient recording.
3. Explain computer-assisted medical imaging in detail.
4. Explain the role of expert systems and neural networks in medical decision-making.
5. Discuss the role of telemedicine and telesurgery in modern healthcare.
6. Explain any three databases in medical related applications.

(5 × 10 = 50)

## Section B

*Answer any* **ten** *questions.*

*Each question carries 5 marks.*

1. Discuss the importance of E-health services in patient care.
2. Write a short note on security issues in medical informatics.
3. Write a short note on computerise prescription for patients.
4. Discuss the role of intranet in implementing Computerised Patient Record in hospitals.

5. How did computer assisted medical imaging helps radiation therapy?
6. Explain the significance of Intelligent Laboratory Information Systems.
7. Discuss production rule systems and their medical applications.
8. Explain how computers assist in surgery planning and design.
9. Write a note on computer-assisted surgical simulation.
10. Discuss how computer technology helps handicapped patients.
11. Write a short note on any two computer network topologies.
12. Explain the importance of data integrity and security in medical databases.

(10 × 5 = 50)

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# M.Sc. (BIOMEDICAL INSTRUMENTATION) DEGREE EXAMINATION SEPTEMBER 2026

## Fourth Semester

AUTOMATION AND QUALITY CONTROL IN BIOMEDICAL ENGINEERING

(2024 Admissions—Regular/2022—2023 Admissions—Supplementary/2021 Admissions—First Mercy Chance/2020 Admissions—Second Mercy Chance/2019 Admissions—Final Mercy Chance)

Time : Three Hours | Maximum Marks : 100

## Part A

*Answer any* **five** *questions.*
*Each question carries* 10 *marks.*

1. Explain the control of legged robotic devices in semi structured environment.
2. Discuss on methods of obstacle avoidance use in mobile robotics.
3. Describe the concept of robotic radio surgery.
4. Discuss the surgical procedure in orthopaedics while using medical robotics.
5. Describe the concept of quality policy development in the context of biomedical engineering.
6. Write a detailed note on Food and Drug Administration (FDA) regulations.

(5 × 10 = 50 marks)

## Part B

*Answer any* **ten** *questions.*
*Each question carries* 5 *marks.*

1. Define mobile robotics and give its two main applications.
2. Write short notes on communication control in robotic systems.
3. Write short notes on vision systems in mobile robotics.

**Turn over**

4. Discuss on the nano devices used in robotic surgery.

5. Write a short note on route planning in mobile robots.

6. Write short notes on robotic neurosurgery.

7. Write a note on computer assisted surgery.

8. Define haptic interface and give one real-world application.

9. Why is standardization a necessity? What are its different types?

10. Describe in detail any one tool for quality control.

11. Write short notes on designing for quality.

12. Explain why recalibration is necessary in biomedical instruments and give two examples.

(10 × 5 = 50 marks)

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# M.Sc. (BIOMEDICAL INSTRUMENTATION) DEGREE EXAMINATION SEPTEMBER 2026

## Fourth Semester

HOSPITAL MANAGEMENT SCIENCE

(2024 Admission — Regular/2022—2023 Admissions—Supplementary/2021 Admission — First Mercy Chance/2020 Admission — Second Mercy Chance/2019 Admission — Final Mercy Chance)

Time : Three Hours

Maximum Marks : 100

## Part A

*Answer any* **four** *questions.*
*Each question carries* 20 *marks.*

1. Explain the classification and types of hospitals with suitable examples.
2. Describe the role of Hospital Information System in managerial decision-making.
3. Explain the process of manpower planning, recruitment and selection in hospitals.
4. Discuss the methods of inventory control in hospitals with reference to ABC and VED analysis.
5. What are the objectives and functions of marketing management in healthcare ? Explain.
6. Explain the role of Quality Circles and Kaizen in hospital quality management.

(4 × 20 = 80 marks)

## Part B

*Answer any* **four** *questions.*
*Each question carries* 5 *marks.*

1. What are the functions of the biomedical department in a hospital ?
2. Write short notes on delegation of authority.

**Turn over**

3. Write a short note on collective bargaining.

4. Explain the role of cost control in hospital purchase management.

5. Write a note on the significance of market research.

6. Explain Pareto analysis in quality control.

(4 × 5 = 20 marks)