



Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech Degree S6 (R,S) Exam April 2025 (2019 Scheme)

**Course Code: EET312****Course Name: BIOMEDICAL INSTRUMENTATION**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer all questions, each carries 3 marks.*

Marks

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|----|--|-----|
| 1  | Discuss the problems encountered in measuring living systems   | (3) |
| 2  | Describe the physiology of respiratory system.   | (3) |
| 3  | Illustrate the Einthoven triangle and describe its role in measuring electrical activity of the heart. | (3) |
| 4  | What is phonocardiography? Explain its significance and application in medical diagnostics.            | (3) |
| 5  | What is nerve conduction velocity, and why is it clinically significant?                               | (3) |
| 6  | Describe the basic function of electromyography (EMG) in medical diagnostics.                          | (3) |
| 7  | Describe DC defibrillators and AC defibrillators.  | (3) |
| 8  | What are the primary differences between internal and external pacemakers?                             | (3) |
| 9  | Define macro shock and micro shock, and explain the concept of let-go current.                         | (3) |
| 10 | Discuss the applications of robotics in medical field.   | (3) |

**PART B***Answer one full question from each module, each carries 14 marks.***Module I**

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|----|--|-----|
| 11 | a) Explain the process of generation and propagation of an action potential. Include a neat diagram showing the stages of depolarization and repolarization. | (8) |
|    | b) Describe the different types of bio-potential electrodes and their applications in measuring physiological signals.                                       | (6) |

**OR**

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|----|---|------|
| 12 | a) Discuss the anatomy and physiology of the human cardiovascular system, focusing on the heart.                      | (10) |
|    | b) Explain the equivalent circuit of the skin-electrode interface and its significance in bio-potential measurements. | (4)  |

**Module II**



- 13 a) Describe the oscillometric method of blood pressure measurement. Explain how it differs from the auscultatory method. (8)
- b) With the help of a diagram, explain plethysmography and its use in measuring blood flow. (6)

OR

- 14 a) With the help of a neat diagram, explain the direct method of blood pressure measurement. (7)
- b) Explain the working principle of an ECG machine with a block diagram. (7)

**Module III**

- 15 a) With the help of a neat diagram, describe the procedure for measuring respiratory rate using impedance pneumography and discuss its applications in patient monitoring. (7)
- b) Explain the concept of brain-computer interfacing (BCI) and describe its potential applications in medical diagnostics and rehabilitation. (7)

OR

- 16 a) Describe the different EEG waveforms and their frequency ranges. Explain their significance in diagnosing neurological conditions. (8)
- b) Describe the following respiratory parameters in evaluating lung function. (i) Tidal volume (ii) Vital capacity (iii) Inspiratory reserve volume (iv) Expiratory reserve volume (v) residual volume (vi) Total Lung Capacity (6)

**Module IV**

- 17 a) Illustrate with a neat diagram and explain the operation of an X-ray machine. Discuss the safety measures associated with X-ray usage in biomedical applications. (7)
- b) Explain the working principle of a haemodialysis machine with a neat diagram. Describe its components and the process by which it removes waste products from the blood. (7)

OR

- 18 a) Explain the principle and major components of a Magnetic Resonance Imaging (MRI) machine with the help of a block diagram. What safety precautions should be taken during MRI scanning? (8)
- b) With the help of a neat diagram, describe the principle of lithotripsy. (6)

**Module V**



- 19 a) With a block diagram, explain the working of a heart-lung machine and its significance in surgeries. (8)
- b) Describe the principle of operation for a spectrophotometer with a neat diagram and its applications in clinical laboratory analysis. (6)

OR

- 20 a) Explain the concept of a telemetry system with a block diagram and its applications in patient monitoring. (8)
- b) Discuss the physiological effects of electric current on the human body, and the precautions needed to prevent accidents in a hospital environment. (6)

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