

BIO-MEDICAL INSTRUMENTATION
(AEIE 3241)

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.
Candidates are required to give answer in their own words as far as
practicable.*

Group - A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) Graphical heart sound is recorded in
 - (a) Ballistocardiogram
 - (b) Phonocardiogram
 - (c) Electroencephalogram
 - (d) Both (a) and (b).
 - (ii) Electrical impulse of heart is generated from
 - (a) SA Node
 - (b) AV node
 - (c) Central nervous system
 - (d) none of these.
 - (iii) Frequency range of ECG waveform is
 - (a) 0.05Hz – 100Hz
 - (b) 0.05Hz – 160Hz
 - (c) 1 Hz – 160 Hz
 - (d) 10Hz – 100Hz.
 - (iv) In ECG Waveform P peak represents
 - (a) arterial systole
 - (b) arterial diastole
 - (c) ventricular systole
 - (d) ventricular diastole.
 - (v) Indocyanine green is used in bolus of indicator as it is
 - (a) inert
 - (b) harmless
 - (c) measurable
 - (d) all the above are true.
 - (vi) In biotelemetry subcarrier frequency lies in
 - (a) AF range
 - (b) RF range
 - (c) VHF range
 - (d) none of these.
 - (vii) Unit of X-ray is
 - (a) curie
 - (b) volt
 - (c) farad
 - (d) none of these.

- (viii) Total number precordial chest lead are
 (a) 12 (b) 5 (c) 6 (d) 3.
- (ix) Oxygen and nutrients are supplied to heart muscles through
 (a) Pulmonary Artery (b) Aorta
 (c) Coronary Artery (d) both (a) and (c).
- (x) Frequency range of abnormal heart sound like murmur is
 (a) 30 - 45Hz (b) 50 - 70 Hz
 (c) above 100Hz (d) below 30 Hz.

Group - B

2. (a) Define Resting Potential and Action Potential. Explain the process of Depolarization and Repolarization.
 (b) Describe the step by step electrical impulse conduction through the wall of chambers of heart.
 (c) Draw Einthoven's triangle and mark various lead configurations.
(2 + 3) + 3 + 4 = 12
3. (a) Define: half-cell potential.
 (b) Describe the electrical model of Electrode-Tissue (skin surface) Interface with neat diagram.
 (c) Write short notes on various types of Body surface Electrodes and Microelectrodes.
2 + 4 + (3 + 3) = 12

Group - C

4. (a) With neat diagram describe the different types of transducers and their construction and working used for measuring Blood Pressure.
 (b) What is the normal value of pH of Blood? How do you measure pH of Blood?
7 + (1 + 4) = 12
5. (a) What do you mean by Plethysmography? Describe various flow measurement methods using Plethysmography.
 (b) What are the drawbacks of DC magnetic Flowmeter? How the drawbacks are eliminated?
(1 + 5) + (2 + 4) = 12

Group - D

6. (a) What is Cardiac Pacemaker? How does it Work? Describe the construction of Pacemakers.
 (b) Discuss types of Synchronous Pacemakers and describe their operation with neat block diagram.
(1 + 2 + 3) + 6 = 12
7. (a) What is ECG? Describe the 12- lead system of ECG with neat diagram.
 (b) What are the common Artefacts in ECG.
(1 + 7) + 4 = 12

Group - E

8. (a) What is EEG? List the brain waves and their frequency.
 (b) State the principle of generation of X-Ray.
 (c) Describe the Data acquisition system of CT.
(2 + 3) + 4 + 3 = 12
9. (a) Describe the various ultrasonic imaging or scanning techniques.
 (b) What is Electromyography? Describe two electrodes for EMG measurement.
 (c) What is Biotelemetry? Describe the components of Biotelemetry.
5 + (1 + 2) + (1 + 3) = 12