

A

Time: 3 Hours

Marks: 80

1. Question no. 1 is compulsory.
2. Figures to the right indicate full marks.
3. Draw suitable diagram/sketches if required.

- Q1 Answer any four: 20
- a) What will be the approximate amplitude of amplified ECG (gain 1000) in avR lead, if the individual potentials at RA= 1.6 mV, LA= 1.2mV, LL= 0.8 mV. What is your assumption?
 - b) With the help of suitable illustrations explain how maternal ECG is rejected in foetal heart rate monitor to get accurate results.
 - c) Compare and contrast the unipolar and bipolar lead techniques in Biopotential recording
 - d) What is a point of care device? Suggest the design criteria for a point of care device to monitor blood glucose level at a remote place.
 - e) What is the significance of skin resistance measurement?
- Q2 20
- a) What is the difference between the sodium and potassium conductance of cell membrane? What is the reason for this difference?
 - b) Which ions contribute the negative charge to intra cellular environment?
 - c) Why right leg is always taken as a reference electrode? Also, if the patient has lost (amputated) right leg, where would you connect the reference electrode?
 - d) Why is it desirable to record the biopotentials with differential amplifiers?
- Q3a Enlist the different sources of noise in biopotential recording? How to remove them? 7
- Q3b Draw and explain Einthoven triangle for ECG lead system. Using Einthovens triangle explain the selection and criteria for reference in ECG instrumentation. 7
- Q3c Explain 10/20 electrode placement in EEG Recording. Elaborate the need of montages in EEG recording systems. 6
- Q4a Explain the operation of Sub-Modulator used in Pulse width modulation techniques with suitable circuit diagram. 10
- Q4b Define and explain "Cardiac Arrhythmia" with the help of neat block diagram of the system used for its recording. 10
- Q5a Draw and explain the abdominal foetal ECG system for foetal heart rate measurement with neat block diagram and illustrations 10
- Q5b Draw and explain the block diagram of respiration rate monitor. 10

Q6

Draw and label the following waveforms: (any four)

- 1) ECG in Tachycardia, bradycardia, atrial fibrillation, premature ventricular contraction
- 2) Normal ECG waveform in lead I, II and III
- 3) EEG in deep sleep, alert state, epileptic state
- 4) Blood pressure waveform measured with direct technique
- 5) PCG
- 6) EMG

Q1 d) portable, small in size, battery operated, easy to use, reusable strips, cost effective, quick response time, reliable, LCD display