Total number of printed pages: 02 **D/6/DIE602**

2023

BIOMEDICAL INSTRUMENTATION

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

Part-A: Answer all questions

1. a) The instrument used for recording the heart sound is …….

   b) ECG stands for …….

   c) When an action potential is generated, the cell is in the ..... state.

   d) The fluid outside the cell is called ……..

   e) When the heart ventricles are contracting, the atriums are.....

   f) ……. number of unipolar limb lead configurations are in ECG measurement.

   g) The right leg is always connected to ....., in all configurations of ECG measurements.

   h) The minimum number of electrodes needed to measure a biomedical signal is.....

   i) ..... is the natural pacemaker of heart.

   j) Microelectrodes are used for measuring ……. potentials.

   k) ……. number of chest lead configurations are in ECG measurement.

   l) Floating electrode is a type of..... bioelectrode.

   m) The P wave of ECG represents ..... depolarization.

   n) .....is the asynchronous contraction of heart chambers.

   o) Human heart has ..... valves.

   p) The ultrasound machine uses …… transducer.

   q) .....mm of Hg is the systolic pressure of a healthy person.

   r) The instrument used for recording the electrical activity of the brain is

.....

s) The ..... limb electrode is connected to the amplifier positive terminal in the lead III configuration of ECG measurement.

t) The instrument which helps to measure a person's blood volume changes in a limb is .....

1*20=20

Part-B: Answer any four questions

2. a) With a block diagram, explain the biomedical instrumentation system. 5
   b) Explain cell action potential. 5
   c) Explain bioelectrode and its types. 10

3. a) With a neat diagram, explain the working of the following:
      (i) DC Defibrillator
      (ii) X-ray Machine

10+10=20

4. a) With a neat diagram, explain the working of a human heart. 10
   b) Write about the following:
      (i) EEG
      (ii) EMG
      (iii) ERG
      (iv) EOG
      (v) Differential Amplifier 2*5=10

5. a) With a block diagram, explain the working of a pacemaker. 6
   b) Explain sphygmomanometer. 7
   c) Explain photoplethsymograph and its types. 7

6 a) Design a circuit to measure ECG using Lead I configuration with an amplification of 1000. 14
   b) Draw all unipolar limb lead configurations in ECG measurements. 6

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