A   Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code: 53B04

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Third Semester

Biomedical Engineering

15UBM304 **-** BIOMEDICAL INSTRUMENTS

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. During the initial portion of the action potential, the membrane   CO1- R
 cannot respond to any stimulus, no matter how intense the
 stimulus is. This interval is called

   (a) Absolute refractory period   (b) Relative refractory period

   (c) current refractory period   (d) stimulus

2. Prominent signals generated by human body are due to   CO1- R
 _____

   (a) Ionic voltage   (b) Monitory signal   (c) Magnetic signal   (d) Current signal

3. In electrocardiography, lead aVR is best known as: CO2- R

   (a) Unipolar   (b) Bipolar   (c) Augmented unipolar   (d) Augmented bipolar

4. Which of the following have higher action potential propagation   CO2- R
 rate?

   (a) Nerve cell   (b) Heart muscle   (c) Thigh muscle   (d)All of the mentioned

5. _____ circuit reduces interference and makes electrical safety in ECG amplifier.   CO3- R

   (a) Driven right leg system   (b) Driven left leg system

   (c) electrode placement system   (d) Isolation amplifier system

6. Which of the following CANNOT be treated as a requirement of bio-instrumentation amplifier?   CO3- R

   (a) Low drift   (b) Low input impedance   (c) High linearity   (d) High CMRR

7. All is true for blood pressure, EXCEPT one below,   CO4 -R

   (a) blood pressure remains same across whole body

   (b) blood pressure is highest in aortic arch

   (c) blood pressure is weaker in veins

   (d) blood pressure is highest in ventricular systole

8. About the resistance to blood flow, all the following is true EXCEPT: CO4- R

   (a) It is inversely proportional to the 4th power of the radius of the vessel

   (b) It is directly proportional to the length of the vessel

   (c) It is independent of the thickness of the vessel wall.

   (d) Is it independent of the Haematocrite

9. Partial pressure of Oxygen in the inspired and expired air is respectively   CO5 -R

   (a) 158 and 116 mm Hg   (b) 158 and 40 mm Hg

   (c) 100 and 95 nn Hg   (d) 40 and 95 mm Hg

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10. pCO2 measure _____ concentration of gas in air/fluid.   CO5- R

(a) total   (b) relative   (c) Direct   (d) indirect

PART – B (5 x 2= 10Marks)

11. Brief in short polarizable and non-polarizable electrodes   CO1- R

12. Define the term latency in EMG.   CO2 -R

13. Enlist the need of 'Right leg driven amplifier' for ECG purpose   CO3- R

14. What is cardiac output?   CO4-R

15. In short, write about Immunologically Sensitive Field-Effect Transistors (IMFETs   CO5 -R

PART – C (5 x 16= 80Marks)

16. (a) Explain in detail about Origin of bio potential and its propagation. CO1- U   (16)

Or

(b) (i) Illustrate equivalent circuit for a pair of electrodes on a subject represented by Electrolyte-Skin Interface   CO1- U   (8)

(ii) Summarize the characteristics of electrodes designed to pick up signals from biological subjects by a non-polarisable Ag-Agcl electrode   CO1- U   (8)

17. (a) Illustrate Einthoven's triangle and explain 12 lead system used for measuring ECG   CO2 App   (16)

Or

(b) Summarize with schematic diagram, the essential components of an EEG machine and emphasize about 10-20 lead placement of electrodes   CO2 Ana   (16)

18. (a) Write technical notes about "Bio-amplifier" requirements ,and discuss about
 i) Op-amp based Differential amplifier and
 ii) 3-stage Instrumentation amplifier   CO3 Ana   (16)

Or

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(b) Write technical notes about need for "Isolation amplifiers"&explain   CO3- Ana   (16)
i) Transformer type and   ii) Optically isolated type

19. (a) How cardiac outputs measured using dye dilution technique and describe it in detail.   CO4- U   (16)

Or

(b) Apply measurement of blood flow by Ultrasonic Doppler-shift method   CO4- App   (16)

20. (a) Sketch and summarize the principle of Ion selective Field effect Transistor (ISFET) for pH measurement   CO5 -U   (16)

Or

(b) Construct a blood cell counter which works under principle of conductivity and explain in detail.   CO5 -U   (16)