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Reg. No. : | | | | | | | | | | |

**Question Paper Code: 55503**

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

Fifth Semester

Electronics and Instrumentation Engineering

15UEI503 - BIOMEDICAL INSTRUMENTATION

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The main advantage of instrumentation amplifier is CO1- R

   (a) Low input impedance (b) High bias and offset currents

   (c) High CMRR (d) Low slew rate

2. _____ electrode is used for the measurement of more than one ions present in the physiological measurement. CO1-U

   (a) Glass (b) Micro

   (c) Body surface (d) Specific ion

3. The Lead vector for lead I, II, III in ECG is CO2-U

   (a) 0, 60, 120 Deg (b) 30, 60, 0 Deg (c) 0, 30, 60 Deg (d) 30, 60, 90 Deg

4. Johnson Noise is otherwise called as _____ noise. CO2- R

   (a) SHOT (b) Flicker (c) Thermal (d) Environmental

5. Which one of the following condition will not a cause of respiratory alkalosis? CO3- R

   (a) Fever (b) Anxiety

   (c) Laryngeal obstruction (d) Salicylate toxicity

6. Homeostatic regulation of the cardiovascular system is designed to maintain _____ CO3- R

(a) Constant blood volume (b) Constant arterial blood pressure

(c) Constant cardiac output (d) Constant venous blood pressure

7. Biological tissues are coagulated by thermal means if the requisite temperature is maintained at CO4- R

(a) $67^oC$ (b) $60^oC$ (c) $70^oC$ (d) $77^oC$

8. In chassis leakage current measurement, the capacitor is employed to imitate the sensitivity of the heart as a function of _____ CO4 -R

(a) Current (b) Voltage (c) Frequency (d) Power

9. Which of the following is not a factor determining spatial resolution? CO5 -R

(a) Frequency (b)Transmit intensity (c) Pulse interval (d) Acquisition

10. X-ray machines operating at tube voltages in the range of CO5- R

(a) 100KV (b) 600 KV (c) 1000KV (d) 400KV

PART – B (5 x 2= 10Marks)

11. If the net flow of ionic change in an action potential goes up only to charge the membrane capacitance ($C = 1\mu F/cm^2$) calculate the net micro moles transferred per unit action potential rising from – 50 mV to + 65 mV? CO1 -Ana

12. List the different types of needle electrode. CO2- R

13. Calculate the cardiac output, given by the following data: spirometer $O_2$ consumption 250ml/min; arterial $O_2$ content, 0.20ml/ml; venous $O_2$ content 0.15 ml/ml. CO3- R

14. State the need for cardiac pacemaker. CO4- R

15. Analyze the biological effects of NMR imaging. CO5-Ana

PART – C (5 x 16= 80Marks)

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| 16. | (a) | Discuss the different types of surface electrodes and their uses. | CO1- U | (16) |
| | | Or | | |
| | (b) | What is the diameter of the tip of micro electrode? Why it should be so small explain? | CO1-U | (16) |
| 17. | (a) | Illustrate the 10-20 lead configuration measurement of EEG measurement, with neat sketch. | CO2- U | (16) |
| | | Or | | |
| | (b) | Explain the electrode configuration, recording methods and waveforms of EMG. | CO2- U | (16) |
| 18. | (a) | Explain working principle of Pulsed doppler flow meter. Why it is preferable over other types of flow meters. | CO3-U | (16) |
| | | Or | | |
| | (b) | Elaborate the direct method of BP measurement with appropriate diagrams. | CO3-U | (16) |
| 19. | (a) | Analyze the physiological effects of electric current on human body. | CO4- U | (16) |
| | | Or | | |
| | (b) | Explain the important safety consideration in all bio-equipped devices in hospitals. | CO4-U | (16) |
| 20. | (a) | Discuss how the ECG and Temperature parameters can be monitored and telemetered. . | CO5- U | (16) |
| | | Or | | |
| | (b) | Explain the working principle of X – Ray machine | CO5- U | (16) |

**55503**