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**Question Paper Code: 55053**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

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)

- \_\_\_\_\_ refers to recording of brains spontaneous activity over a short period of time.  
(a) ECG                      (b) EEG                      (c) EMG                      (d) ERG
- \_\_\_\_\_ electrode is used for the measurement of more than one ions present in the physiological measurement.  
(a) Glass                      (b) Micro                      (c) Body surface                      (d) Specific ion
- \_\_\_\_\_ instrument is used to measure the pumping action of the heart.  
(a) ECG                      (b) EEG                      (c) PCG                      (d) EOG
- Johnson Noise is otherwise called as \_\_\_\_\_ noise.  
(a) SHOT                      (b) Flicker                      (c) Thermal                      (d) Environmental
- The most commonly used method to measure pulsatile blood volume changes \_\_\_\_\_ method.  
(a) Strain gauge                      (b) Thermal                      (c) Gradient                      (d) Photo electric
- The instrument used to measure lung capacity and volume is called a  
(a) Pneumotachometer                      (b) Spirometer  
(c) Oximeter                      (d) Sphygmomanometer

7. Evoked potential components are of short duration, about
- (a) 10 to 15sec (b) 2ms to 1sec  
(c) 5ms to 10sec (d) 10ms to 1sec
8. Biological tissues are coagulated by thermal means if the requisite temperature is maintained at
- (a) 67°C (b) 60°C (c) 70°C (d) 77°C
9. The frequency of currents used in surgical diathermy units is in the range of
- (a) 1-5 MHz (b) >20MHz (c) 20-20MHz (d) 5-10 MHz
10. X-ray machines operating at tube voltages in the range of
- (a) 100KV (b) 600 KV (c) 1000KV (d) 400KV

PART - B (5 x 2 = 10 Marks)

11. If the net flow of ionic change in an action potential goes up only to charge the membrane capacitance ( $C = 1\mu\text{F}/\text{cm}^2$ ) calculate the net micro moles transferred per unit action potential rising from  $-50\text{ mV}$  to  $+65\text{ mV}$ ?
12. Mention the primary signal characteristics and type of electrode which is used for ECG and EEG measurement.
13. Calculate the cardiac output, given by the following data: spirometer  $\text{O}_2$  consumption 250ml/min; arterial  $\text{O}_2$  content, 0.20ml/ml; venous  $\text{O}_2$  content 0.15 ml/ml.
14. Define defibrillator analyzers.
15. State the features of Plethysmograph.

PART - C (5 x 16 = 80 Marks)

16. (a) Explain in detail about the electrical activities associated with bioelectric signals. (16)
- Or
- (b) (i) Write a short note on Microelectrode. (8)
- (ii) What are the problems encountered in measuring more than one ions in a physiological parameter and how are they overcome? (8)
17. (a) Explain in detail about the unipolar and bipolar limb lead configuration in ECG system. (16)

Or

- (b) Illustrate the 10-20 lead configuration measurement of EEG measurement, with neat sketch. (16)
18. (a) (i) Discuss Doppler shift Flow velocity meters for blood flow measurement. (8)
- (ii) Explain working principle of Pulsed doppler flowmeter. Why it is preferable over other types of flowmeters. (8)

Or

- (b) (i) Elaborate the direct method of BP measurement with appropriate diagrams. (8)
- (ii) Write a short note on Rheographic Method of BP measurement. (8)
19. (a) (i) Illustrate the different types of Implantable Pacemakers with suitable diagram. (8)
- (ii) Describe the features of Transthoracic Defibrillators. (8)

Or

- (b) (i) Explain the important safety consideration in all bio-equipped devices in hospitals. (10)
- (ii) Explain the lethal effects of Electric Shock. (6)
20. (a) Explain in detail about Computer Tomography with neat sketch. (16)

Or

- (b) (i) What are all the medical transmitting frequencies? Why it is necessary in to specify them. (6)
- (ii) Discuss how the ECG and Temperature parameters can be monitored and telemetered. (10)
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