



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 132802

Roll No.

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B. Tech.

(SEM. VIII) THEORY EXAMINATION, 2014-15
BIOMEDICAL INSTRUMENTATION

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all questions. All questions carry equal marks.

1 Attempt any four parts of the following. **5x4=20**

- (a) Which one of the components should be determined first in designing an instrumentation system for measurement of physiological variables? Why? Which would you next determine?
- (b) Differentiate between clinical instruments and research instruments? Explain the purpose of body surface electrodes and give their advantages with applications?
- (c) Draw the block diagram of Man-instrumentation system and explain its various system components. Enlist the problems encountered in the Man instrumentation system.

- (d) How does potential propagate in cell? Explain the role of refractory period?
- (e) Explain the piezoelectric transducer, what are their limitations ? Give its dynamic model and also its output equation under steady state condition.

2 Attempt any four parts of the following : **5x4=20**

- (a) How are the potential in muscle fibers measured and what is the record called that is obtained therefrom? Also draw the nature of the potentials recorded.
- (b) What are the problems involved in using flat electrodes in terms of interference or high impedance between electrode and skin? How could you help to eliminate this problem?
- (c) What is bio-potential ? Name six types of bio-potential sources. Also explain polarization, depolarization and repolarization.
- (d) Explain term EPSP and IPSP.
- (e) What do you understand by fibrillation? How do you correct it? Explain DC defibrillator with neat diagram.
- (f) Explain the vector cardiograph? How does it differ from electrocardiograph?

3 Attempt any four parts of the following : **5x4=20**

- (a) Draw the ECG waveform and explain important points in it. What does 1020 ECG measurement?
- (b) Draw the wave shape of blood pressure on a time base and explain it? How is the blood pressure measurement done by sphygmomanometer ?
- (c) What is meant by "plethysonography"? Discuss any one method to implement it clinically?
- (d) Explain the working of ultrasonic spirometer?
- (e) Explain the procedure of measurement of neuronal firing with the suitable diagram.
- (f) Write short note on humidifiers and nebulizers.

4 Attempt any two parts of the following : **10x2=20**

- (a) Explain the principle of computerized axial tomography and compare its method of visualization with conventional x-ray methods.
- (b) How the pacemaker works and explains the difference between the artificial pacemakers with heart's natural pacemaker.
- (c) With diagram explain tonometer operation for eye pressure measurement.

5 Attempt any two parts of the following. **10x2=20**

- (a) In both X-ray and Radioisotope procedure, potentially harmful ionizing radiation is used for diagnostic purposes. Why is the safe intensity of radiation of X-ray much higher than that for isotopes methods? Describe X-ray production arrangement.
- (b) Draw a sketch of neuron and label the cell body, dendrite, axon and axon hillock. Also explain the difference between a motor nerve and a sensory nerve.
- (c) How is the telemetry used as an emergency patient care tool? Explain how four physiological parameters can be monitored and telemetered simultaneously.
