B. Tech.

(SEM. VIII) EXAMINATION. 2006-07

BIO 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) Enlist three basic differences that contribute to communication problems between the physician and the engineer. How can they be overcome?

(b) In designing an instrumentation system for measurement of physiological variables, which of the components should be determined first? Why? Which would you next determine?

(c) What are the objectives of a bio instrumentation system?

(d) What is a mercury strain gauge? Describe its operation and as many biomedical applications of it.

(e) Explain the different types of pressure transducers used in bio instrumentation with suitable diagrams.

(f) Describe the construction and working principle of piezo electric transducer. What are its applications in biomedical system?
2 Attempt any two parts of the following: \( \times \times 2 = 20 \)

(a) (i) 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?

(ii) What is an ear-clip electrode used for?

(b) (i) What is the need of micro electrodes?

(ii) How are the potential in muscle fibers measured, and what is the record called that is obtained therefrom?

(c) (i) What is a bio potential? Name six different types of bio potential sources.

(ii) Do you think the EEG is subjected to frequency discrimination? Explain.

3 Attempt any two parts of the following: \( \times \times 2 = 20 \)

(a) (i) What is electrocardiography? Discuss various characteristic features of ECG amplifiers.

(ii) Explain a method of heart sound measurement.

(b) (i) Draw an analogous electric circuit of cardiovascular system and show how Ohm’s Law and Kirchoff’s Laws could apply in the analog.

(ii) Draw the waveshape of blood pressure on a time base and explain it. What is the dicrotic notch?

(c) (i) What is meant by “plethysmonography”? Discuss one way to make measurements and their clinical implications.

(ii) Why is the impedance plethysmonograph sometimes called a pseudo-plethysmograph?

V-2036] 2 [Contd...
4 Attempt any two parts of the following: \( 10 \times 2 = 20 \)
   (a) (i) Differentiate between ultrasonic diagnosis and x-ray diagnosis.
   (ii) Why is skin surface temperature lower than systemic temperature measured orally?
   (b) (i) What is the difference between death by carbon monoxide poisoning and death by strangulation? Explain.
   (ii) Define the important lung capacities and explain them.
   (c) (i) Explain the operation of a pacemaker and why it is needed.
   (ii) What part of the ECG is the most useful for determining heart rate? Explain.

5 Attempt any two parts of the following: \( 10 \times 2 = 20 \)
   (a) (i) Explain the difference between a motor nerve and a sensory nerve.
   (ii) Draw a sketch of a neuron and label the cell body, dendrite, axon and axon hillock.
   (b) (i) Name two different ways in which electricity can harm the body.
   (ii) Discuss telemetry as an emergency care tool.
   (c) (i) List some advantages and disadvantages of biotelemetry.
   (ii) Explain the use of digital computer in biomedical application and give some examples.