

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

Paper ID : 132802

Roll No. 

--	--	--	--	--	--	--	--	--	--

**B. TECH.**

**Theory Examination (Semester-VIII) 2015-16**

**BIOMEDICAL INSTRUMENTATION**

*Time : 3 Hours*

*Max. Marks : 100*

**Section-A**

**Q1. Attempt all parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)**

- (a) Enumerate the differences between direct and indirect measurement of blood pressure.
- (b) What are graded potentials? Also explain the terms EPSP and IPSP.
- (c) Define the terms: bradycardia, tachycardia and arrhythmia in electrocardiography.
- (d) Explain the terms absolute refractory period, relative refractory period and all or nothing law.

- (e) What are the different types of biomedical transducer?
- (f) Explain the working principle of Water-Bell Spirometer.
- (g) What are Korotkoff sounds? How are they generated?
- (h) Differentiate between afferent and efferent nerves.
- (i) What is ERG signal? Explain the waveform.
- (j) List some advantages and disadvantages of biotelemetry.

**Section-B**

**Q2. Attempt any five questions from this section. (10×5=50)**

- (a) Discuss the basic objectives of a general instrumentation system. Also briefly explain the difference between clinical instrumentation and research instrumentation systems.
- (b) (i) Name the 3 basic types of electrodes for measurement of bioelectric potentials.  
  
(ii) Why are microelectrodes sometimes needed?

- (c) (i) Describe in brief the working principle of a blood pH meter. Also mention the features of its commonly used electrodes.
- (ii) Explain the construction and working of  $p\text{CO}_2$  electrode.
- (d) How direct measurement of blood pressure is done? What is the difference in the information contained in a phnocardigram and an electrocardiogram?
- (e) (i) What are the problems involved in using flat electrodes in terms of interference of high impedance between electrode and skin? How would you help eliminate this problem?
- (ii) What is the need of microelectrodes?
- (f) (i) Draw a sketch of a neuron and label its various parts.
- (ii) What is a 10-20 electrode placement system for EEG ?
- (g) Discuss telemetry as an emergency care tool. Explain how four physiological parameters can be monitored and telemetered simultaneously.

- (h) Write short notes on :
- (i) Magnetic resonance imaging
  - (ii) Hearing aides

### Section-C

**Note: Attempt any two questions from this section.**

**(15×2=30)**

- Q3. (a) What do you mean by vector cardiograph? How is it different from electrocardiograph?
- (b) What is meant by plethysmography? Discuss one way to make measurements.
- Q4. (a) Differentiate between ultrasonic diagnosis and x-ray diagnosis.
- (b) Explain the operation of a pacemaker and why it is needed?
- Q5. (a) Define important lung capacities and explain them.
- (b) For what measurements can a spirometer be used? What basic lung volumes and capacities cannot be measured using Spirometer? Why?