

2123  
B.E. (Biotechnology) Fifth Semester  
BIO-515: Bio-Instrumentation

Time allowed: 3 Hours

Max. Marks: 50

*NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.*

x-x-x

1. Answer the following questions briefly:

- a) Define gradient potential.
- b) Differentiate between active transducer and passive transducer.
- c) Explain Larmor frequency.
- d) Explain the condition of symmetry in an even and odd signal.
- e) Define cardiac output.
- f) What is the importance of Signal to noise ratio in a communication system.
- g) Explain bipolar pacing.
- h) What do you understand by the term – pure tone audiometer.
- i) Name the type of radiations used in CT scan.
- j) Define acoustic impedance.

1x10=10

**SECTION A**

- 2a Explain with proper diagram working of resistance transducers: 5
- b What is the importance of Fourier series and Fourier transform wrt to bioinstrumentation. Also obtain the Fourier transform for a unit step system. 5
- 3a Prove that given sinewave signal is a periodic signal 4  
 $X(t) = a \sin \omega_0 t$
- b Explain auscultatory method of blood pressure measurement using mercury sphygmomanometer. 6
4. Differentiate between the analog and digital signal? What are the advantages of digital signals. Also Explain the A/D conversion process using the proper diagram. 3+3+4

**SECTION B**

- 5a Elucidate the basic principle, components and working of evoked potential audiometer. 5
- b Explain the imaging technique based on magnetic moment of hydrogen nucleus. 5
- 6a Elucidate sensing/ modulation of the electrical signal at interface using bioelectrode. Give classification of biopotential electrodes. 5
- b Explain the basic principle, electrode placement and waveform obtained in ECG. 5
7. Explain the generation and transmission of nerve impulse. Elucidate the 10