Exam. Code: 0909
Sub. Code: 33372

2124

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. I which is compulsory and selecting two questions from each Section.

x-x-x

1. Answer the following questions briefly:
   a) Sketch the unit step and unit impulse signal.
   b) Define cardiac output.
   c) Explain the significance of signal to noise ratio in signal processing.
   d) What do you mean by LTI system.
   e) What do you mean by term virtual instrumentation.
   f) Define Larmor frequency.
   g) Draw and label the ECG waveform .
   h) What do you mean by the term Quantization.
   i) What is a pure tone audiometer.
   j) Define the term - monophasic and biphasic defibrillation. 1x10=10

SECTION A

2a What do you mean by causal and non causal systems ? List the different type of signals used in signal processing. 5

b Find the fourier series for a rectangular waveform having the time period of T 5

$$X(t)=+A \quad \text{for } -T/4 < t < +T/4$$
$$0 \text{ Elsewhere}$$

3a Explain with proper diagram how the analog to digital conversion takes place. 5

b Explain the principle of working of active transducers taking any one example. 5

4a Explain how with the help of lissagous patterns frequency of any unknown signal is calculated . 5

b Explain the basic principle and working of electromagnetic blood flowmeter. 5

Section B

5a Explain the electrode placement for signal acquisition and characteristics of waveform obtained in EEG. 5

b Explain the components of pacemakers and give working of ventricular demand pacemaker. List its advantages over asynchronous pacing. 5

6. Write short note on- 5,5
   a) Basic principle, factors affecting resolution and applications of ultrasonic imaging.
   b) Types of electrodes for biopotential recording and tissue stimulation.

7. Explain the resting membrane potential, graded potential, action potential and refractory period for a neuron. Give significance of each of the processes. 10

x-x-x