Course Code: **23EC6D12**

BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE

(AUTONOMOUS)

III-B.Tech II-Semester Regular Examinations (BR23), April/May - 2026

BIOMEDICAL INSTRUMENTATION (ECE)

Time: 3 hours Max. Marks: 70

Question Paper consists of Part-A and Part-B
*Answer **ALL** the question in **Part-A and Part-B***

PART–A (10 x 2 = 20M)

		Marks	CO	BL
1. a)	What is the significance of Na-K pump in human cell and how electricity is generated from the human cell	(2M)	CO1	BL1
b)	What is the significance of non-polarized electrodes in biomedical engineering application	(2M)	CO1	BL1
c)	Explain significance of Korotkoff sound in auscultator indirect blood pressure measurement system	(2M)	CO2	BL2
d)	In dye dilution method, mass of the ICG dye is 5 mg, average dye concentration is 2 mg/liter and time taken to dissolve the dye is 0.5 min, calculate the blood flow rate	(2M)	CO2	BL2
e)	What is the requirement of calibration in biomedical instrumentation	(2M)	CO3	BL1
f)	During ventricular defibrillation, where the paddles of the DC defibrillator should be placed	(2M)	CO3	BL1
g)	In a bio-telemetry system, what is the relation between bandwidth, channel capacity and SNR	(2M)	CO4	BL2
h)	Distinguish between spectrophotometer and flame photometer to detect the presence of gas content in the human blood stream	(2M)	CO4	BL2
i)	Explain the concept of let-go current and chassis leakage current in terms of patient safety	(2M)	CO5	BL1
j)	Explain how the MRI image is formed and how it is useful	(2M)	CO5	BL1

PART–B (5 x 10 = 50M)

2a.	Explain the system architecture of overall biomedical measurement system using appropriate block diagram. Explain the function of different blocks	5(M)	CO1	BL2
b.	Explain the concept of resting potential, graded potential and action potential	5(M)	CO1	BL2
	(OR)			
3a.	What are the different origins of bio signals and how bio signal is generated from human body	5(M)	CO1	BL2
b.	Explain the concept of skin-electrode interface with proper diagram and equivalent circuit diagram of skin-electrode interface	5(M)	CO1	BL2

4a.	Explain the working principle of 12-lead ECG system and its electrode placement. What is the significance of driven right leg (DRL) in ECG measurement	3+2 (M)	CO2	BL2

b.	Explain the concept of Pan-Tompkin's QRS detection method and how it is better than derivative based method	5(M)	CO2	
	(OR)			
5a.	Explain the concept of Doppler shift flow velocity meter for non-invasive measurement of blood pressure. Derive the formula for the flow velocity for the blood flow	5(M)	CO2	BL2
b.	Explain the concept of plethysmography and how it calculates residual volume and functional residual capacity of the lungs	5(M)	CO2	BL2
6a.	Explain the concept of pacemaker and types of pacemaker. What are the different type of pacing methods in the pacemaker?	10(M)	CO3	BL2
	(OR)			
7a.	What are the different modes of ventilators used to treat patients with COPD? Explain the working of each of the modes	10 (M)	CO3	BL2
8a.	Draw the circuit diagram of DC defibrillator and explain the concept of defibrillator. Distinguish between isolated and non-isolated output DC defibrillator	5+5 (M)	CO3	BL2
	(OR)			
9a.	Explain the concept of blood cell counter using optical method using appropriate block diagram. What is the use of photomultiplier in optical method	5(M)	CO4	BL2
b.	Explain the concept of super heterodyne receiver for the bio telemetry application with proper block diagram	5(M)	CO4	BL2
10a.	Explain the system architecture of X ray machine with proper block diagram. How the X ray image is formed using the intensity map.	5+5 (M)	CO5	BL2
	(OR)			
11a.	Explain the concept of data acquisition system for computer based tomography scanner	5(M)	CO5	BL2
b.	How the image is formed using computed tomography. Explain it with proper block diagram	5(M)	CO5	BL3

Subhranshy

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Subhranshu Pattnaik