B.E. ELECTRICAL ENGINEERING 3RD YEAR 2ND SEMESTER EXAMINATION, 2024

SUBJECT: - BIOMEDICAL INSTRUMENTATION

Time: **Three hours**

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

No. of Questions	PART- I	Marks
1.	Answer any ONE. [CO4-K4] (a) How do you capture EMG waveform from a localized area of muscle fibers? Draw the appropriate schematic diagram showing the positioning of electrode and end plates. Draw also the pattern of a typical waveform obtained in the end plates. State assumptions for which all the MUAPs can be same in a particular MUAPT. (b) What is the Einthoven Triangle? How do you capture voltages related to the triangle? Explain with appropriate diagram.	12
2.	Answer any ONE. [CO3-K3] (a) Show that the magnitude of voltages obtained from augmented leads are larger than the normal leads. (b) Describe the method of positioning of EEG electrodes as per the international 10-20 system. Draw appropriate schematic diagram.	12
3.	Write short notes on any TWO. [CO2-K2] a) Generation and propagation of action potential b) The process of polarization and depolarization in bio cells c) Patch clamp technique	7+7=14

4.	Answer any TWO: [CO1-K1] Compare: (a) Absolute and Relative refractory period (b) Sensory evoked potential and motor evoked potential (c) Ion channel and ion pump	6x2=12

Ref No: ***Ex/EE/PE/H/T/327A/2024***

B.E. ELECTRICAL ENGINEERING THIRD YEAR SECOND SEMESTER EXAM 2024

SUBJECT: - BIOMEDICAL INSTRUMENTATION(HONS.)

Time: Three hours **Full Marks 100**
(50 marks for each part)

Use a separate Answer-Script for each part

No. of Questions	PART-II(50 Marks)	Marks
	Answer Question No. 1 and any three (3) from the rest (14 + 3 X 12 = 50)	
1.	A two dimensional biomedical data is shown in the table given below. Two dimensions are taken as x and y. Physical significance of each dimension is not disclosed. Find and choose a suitable principal component for the data set to reduce its dimension. Show the modified data.	14
2.	What is **"Plethysmography"?** Explain **"Impedance Plethysmography"** with proper diagram and show the calculations to obtain the blood volume change from the changes in electrical impedance with respect to the basal impedance.	1+5+6
3.	What is an ***"eigenface"?*** Explain the use of ***"eigenface"*** for biometric application.	4+8
4.	What are the different types of noises which play significant roles in biomedical instrumentation? Explain different methods briefly, for elimination of such noises.	5+7
5.	**Write short notes on the following topics (Any two)**	6+6
a)	Comparison of Computed (Axial) Tomography, MRI and PET Scan related to biomedical instrumentation	
b)	Optical absorption difference based pulse oximetry	
c)	Oscillometric method of blood pressure measurement	

x	y
10	6
4	1
2	3
8	2
6	5
8	6
5	3
9	5
7	4
8	2