BACHELOR OF ENGINEERING (ELECTRICAL ENGINEERING) 5TH YEAR 2ND SEMESTER EXAMINATION, 2023

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
	Answer any **Three only.**	
	Two marks reserved for neat and well-organized answers.	
1.	What do you mean by	8x2
	(i) Bio-potential (ii) Ion channel	
	(iii) Resting potential (iv) Stimulus	
	(v) Channel gating (vi) Transduction in a cell	
	(vii) EPSP (viii) Whole cell current	
2.	Compare between:	4x4
	(a) Depolarization and hyperpolarization	
	(b) Ion channel and ion pump	
	(c) Spontaneous potential and evoked potential	
	(d) Absolute and relative refractory period	
3.	(a) Explain with appropriate schematic diagram the method of generation and propagation of action potential in nerve cells.	10
	(b) What is saltatory conduction? How is it different from the channel based conduction?	6
4.	(a) Illustrate with appropriate schematic diagram the patch clamp	

	technique. What is the purpose of using such technique?	12
	(b) Mention the different types of Action Potential that are found in various sites of human body.	4
5.	Write short notes on:	8+8
	(a) Leads of ECG	
	(b) Action Potential in cardiac cells	

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B.E. (ELECTRICAL ENGG) 5THYEAR 2ND SEMESTER EXAMINATION, 2023

SUBJECT: - BIO-MEDICAL INSTRUMENTATION

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

Use a separate Answer-Script for each part

No. of Questions	PART-II	Marks
	Answer any four, 2 marks for well organized answers	
	Answer any 4 (12X4=48)	
1.	What are the different types of noises which play significant roles in biomedical instrumentation? Explain different methods for elimination of such noises.	5+7
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 are the importance of pulse oximetry? Explain the basic principle of optical absorption difference based oximetry. Describe a suitable signal amplifier for this application with explanations.	2+6+4
4.	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 dataset to reduce its dimension. Show the modified data.	12
5.	**Write short note on the following topics**	6+6
a)	Shielding strategies for bio-medical signal acquisition.	
b)	Computed (Axial) Tomography	
c)	Auscultatory and Oscillometric methods of blood pressure measurement	

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