BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER : IV**
BRANCH: BIOTECHNOLOGY **SESSION : SP/2025**

SUBJECT: BE215R1 CELLULAR ELECTROPHYSIOLOGY

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Illustrate the types of transport mechanisms participating in a plasma membrane, which are involved in ionic transport.	[5]	CO1	Remember
Q.1(b)	Discuss the ionic mechanism of generation of 'action potential' in an excitable cell?	[5]	CO1	Understand
Q.2(a)	What are the important four physical laws that lays the foundation blocks in applied cellular electrophysiology.	[5]	CO2	Understand
Q.2(b)	Write the expressions for Nernst-Plank and Nernst equations and explain their relevance in cellular electricity evaluation.	[5]	CO4	Evaluate
Q.3(a)	Explain different types of membrane conductance in equivalent electrical circuit representation of neuronal function.	[5]	CO3	Analyze
Q.3(b)	Explain the ionic conductance in large nerve fiber and illustrate the parallel conduction model of cellular electrophysiology.	[5]	CO2	Analyze
Q.4(a)	With a suitable electrical circuit diagram, explain the recording setup and function of a voltage clamp recording system in active transport mechanism.	[5]	CO2	Understand
Q.4(b)	Explain the types and functions of different types of neuronal synapses and draw the general electrical analogy of a functional synapse. How these synapses behave to generate EPSP and IPSP.	[5]	CO2	Understand
Q.5(a)	How can a brain-computer interface support the life of a stroke person?	[5]	CO5	Apply
Q.5(b)	Discuss the importance of application of cardiac electrophysiology in development a cardiac therapeutic system.	[5]	CO4	Analyze

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