BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2025)

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

SUBJECT: BE215R1 CELLULAR ELECTROPHYSIOLOGY

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	Write about the ionic basis of creating hyperpolarization in the cell.	[2]	CO1	Remember
Q.1(b)	Explain different types of sodium ionic currents involved in generation of action potentials in excitable cells.	[3]	CO2	Understand
Q.2(a)	Draw the layout of special junctional tissues of heart and label each of its components.	[2]	CO4	Understand
Q.2(b)	Illustrate the electrical activities of the SA nodal fiber of heart and their correlations with cardiac muscle action potential.	[3]	CO4	Apply
Q.3(a)	Predict and draw the waveforms of changes membrane potential for sodium and potassium ions independently, when flow of other ions are in equilibrium.	[2]	CO1	Remember
Q.3(b)	If the ratio of permeabilities for potassium, sodium and chlorine in order of 1 : 0.03 : 0.1 at the rest of the cell, using Goldman-Hodgkin-Katz voltage equation of the membrane, calculate the membrane potential of the cell. For the calculations, consider the value of RT/F=61.	[3]	CO2	Analyze
Q.4(a)	Explain the four important physical laws involved in cellular electrophysiology.	[2]	CO1	Understand
Q.4(b)	Illustrate the calculation of Nernst-Plank equation and Nernst equation.	[3]	CO3	Analyze
Q.5(a)	With examples, explain the primary and secondary types of active transport of ions.	[2]	CO4	Understand
Q.5(b)	With block diagram, explain different bio amplifiers used to record cellular electrophysiology	[3]	CO3	Apply

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