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

CLASS: B.TECH **SEMESTER: IV**
BRANCH: BIOTECHNOLOGY **SESSION : SP/2020**

SUBJECT: BE215 CELLULAR ELECTROPHYSIOLOGY

TIME: 2 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates may attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.

				CO	BL
Q1	(a)	Write the Goldman's equation for calculation of resting potential of a cell.	[2]	CO1	Understand
Q1	(b)	Illustrate the equations for the calculation of ionic currents and conductance for different ions of the cell membrane and also construct the equivalent circuit representation of cell membrane.	[3]	CO3	Apply
Q2	(a)	Write about the ionic basis of creating hyperpolarization in the cell.	[2]	CO1	Remember
Q2	(b)	Explain different types of sodium ionic currents involved in generation of action potentials in excitable cells.	[3]	CO2	Understand
Q3	(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
Q3	(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
Q4	(a)	Draw the layout of special junctional tissues of heart and label each of its components.	[2]	CO4	Understand
Q4	(b)	Illustrate the electrical activities of the SA nodal fiber of heart and their correlations with cardiac muscle action potential.	[3]	CO4	Apply
Q5	(a)	What is microscopic and mesoscopic potentials of the central nervous system?	[2]	CO1	Understand
Q5	(b)	Explain how the biosignals can be applied for the development of support devices in medical system.	[3]	CO4	Evaluate

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