

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

CLASS: B.TECH
BRANCH: BIOTECHNOLOGY

SEMESTER : IV
SESSION : SP/2023

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.
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		CO	BL
Q.1(a)	What do you understand by the term 'action potential'? Discuss each of its components with their physiological relevance.	[5] CO1	Understand
Q.1(b)	Discuss the important types of transport mechanisms participating in a plasma membrane.	[5] CO1	Remember
Q.2(a)	Describe the four physical laws applied in the cellular electrophysiology.	[5] CO2	Understand
Q.2(b)	Write the Goldman's equation and solve the following: 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 $RT/F=61$.	[5] CO4	Evaluate
Q.3(a)	Describe the characteristics of active and passive electronic components with their analogy in cellular electrophysiology.	[5] CO2	Understand
Q.3(b)	Explain the mathematical and electronic concepts to illustrate the parallel conduction model of the cellular electrophysiology.	[5] CO3	Analyse
Q.4(a)	With a suitable electrical circuit diagram, explain the recording setup and function of a voltage clamp recording system.	[5] CO2	Understand
Q.4(b)	Draft a technical note on the fundamentals of cable theory. How the propagation of electrical impulses in a neuron can be explain with the cable theory?	[5] CO3	Analyse
Q.5(a)	Discuss the importance of electrophysiology of ECG and its recording details.	[5] CO4	Analyse
Q.5(b)	How man-machine interface can support the life of a disabled person? Discuss with suitable example.	[5] CO5	Apply

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