Indian Institute of Information Technology Allahabad

Mid / End Sem Question Paper

Course Name: Biology for Engineers **Course Instructor/ Co-ordinator:** Dr Sangeeta Singh & Dr Sintu Samanta

Course Code: AS2xx **Program Name(s):** B. Tech ECE 3rd Sem **Exam Date:** 29/11/2024 (1st Meeting) **MM:** 40

Answer all questions, each carrying marks specified in ( ). Draw the diagram wherever necessary.

1. Describe how an action potential is generated and propagated across the membrane in neuron. [6]
2. Differentiate between the cardiac and skeletal muscle cell action potential graph. [3]
3. Explain different types of stem cells on the basis of their potential. What are induced Pluripotent stem cells (iPSCs)? [6]
4. a) Explain why the resting membrane potential is negative inside the cell relative to the outside? (b) A neuronal cell is initially at Vm=0 mV. The concentrations of K^+ inside and outside the cell are: $[K^+]$ **out**=5 mM, $[K^+]$ **in**=150 mM. If a channel for K^+ opens, will K^+ flow into or out of the cell? [3+2]
5. The nucleotide sequence of the sense strand of a DNA molecule is 5' ATGCATACTTAA 3'. Write the nucleotide sequence of the corresponding antisense strand and the encoded mRNA molecule. [2]
6. What are the building blocks of DNA, protein and carbohydrate? [2]
7. Write the names of the monosaccharide of Lactose and Sucrose. [2]
8. What is alternative splicing? [2]
9. What are Fats and Oils? [2]
10. Name the different stabilizing forces that maintain the Tertiary structure of a protein. [2]
11. Write the 6 possible reading frames of this hypothetical sequence: CGCTACGTCTTACGCTGG. [2]
12. In which macromolecules, we find phosphodiester, glycosidic, and peptide bonds to form? [2]
13. How a disulfide bond is formed in any protein molecule? [2]
14. Write/draw the 4 possible stereoisomers of this compound. [2]