

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

F February / March 2023 Semester End Main Examinations

Programme: B.E.

Branch: Information Science and Engineering

Course Code: 20IS7BSBIO

Course: Biology for IT Engineers

Semester: VII

Duration: 3 hrs.

Max Marks: 100

Date: 28.02.2023

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

- 1 a) Describe Synapse and Synaptic plasticity. **06**
- b) Explain the components of BCI and illustrate the functions of each block. **10**
- c) Enumerate rapid rise and fall of membrane potential with spike generation. **04**

UNIT - II

- 2 a) Justify why Computational Biology has emerged as an important discipline in recent years. **10**
- b) Illustrate how RNA is produced when DNA is transcribed to different protein products. **10**
DNA → RNA → PROTEIN
- c) Will neurons be in resting potential? When does this condition occur?

OR

- 3 a) Illustrate how RNA is produced from a DNA template during transcription **10**
- b) Paraphrase the central dogma of molecular biology describing how genetic information is stored and interpreted in the cell. **10**

UNIT - III

- 4 a) Briefly explain normalization schemes of RNA Sequencing and write 'R' code to compute CPM, RPKM and TPM **10**
- b) Elaborate the common steps of high – throughput sequencing. **10**

OR

- 5 a) Explain in detail the steps within the context of genomic data analysis. **10**
- b) In Transcriptional and post-transcriptional regulation, explain how are genes controlled. **10**

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - IV

- 6 a) i. Schematically represent the structure of DNA Nucleotide and how nucleotides can link together. **10**
- ii. Suppose that l (string length) is 8, that $f(x)$ is equal to the number of ones in bit string x (an extremely simple fitness function), that n (the population size) is 4, that $p_c = 0.7$, and that $p_m = 0.001$. Calculate Fitness value and Average Fitness value.

Chromosome Label	Chromosome String
A	00000110
B	11101110
C	00100000
D	00110100

- b) Illustrate the Search space and Fitness algorithm with suitable examples. **10**

UNIT - V

- 7 a) Illustrate the Operations on DNA molecules. **10**
- b) Provide the steps involved in Basic Genetic algorithm. Explain GA operators of a simple genetic algorithm. **10**
