JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- FEB-2024

BTech-VIII Semester [BI]

COURSE CODE(CREDITS): 18B1WBI831 (3) MAX. MARKS: 15

COURSE NAME: Computational Molecular Evolution

COURSE INSTRUCTOR: Dr. Tiratha Raj Singh MAX. TIME: 1 Hour

Note: All questions are compulsory. Marks are indicated against each question in square brackets. Calculator is permitted.

Q.1. Explain the process of evolution through various discoveries, mechanisms and evidences. Connect major theories of evolution in this discussion. (CO-1) [4]

Q.2. What is the difference between homology and homoplasy? Elaborate through an example where lineages are connected through evolution. (CO-2) [3]

Q.3. A set of homologous genes (Gene A and Gene B) were duplicated from an ancestral gene with the substitution rate of 8.2 and 12.3 respectively. Their time for rate of evolution were 800 years and 400 years for gene A and gene B respectively. Compute the time of gene duplication while considering it a simple case of evolution. (CO-1,2) [3]

Q.4 What is the rate of evolution in terms of a biological sequence? How we can calculate rate of evolution computationally? Demonstrate with an example. (CO-1,2) [2]

Q.5. Realize the significance of following processes in the light of evolution:(CO-1,2) [1*3=3]
(i) Human position on the branch of evolutionary tree along with great apes.
(ii) Rate of change of different proteins.
(iii) High rate of evolution in HIV.