JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION-2022

B.Tech-VII Semester (BT)

COURSE CODE (CREDITS): 18B1WBI731(3) MAX. MARKS: 35

COURSE NAME: Computational Systems Biology

COURSE INSTRUCTORS: Dr. Tiratha Raj Singh MAX. TIME: 2 Hours

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

Q1. "*Systems biology is in the eye of the beholder*". Justify this statement by explaining how it is associated with physiology and other molecular sciences at system level? (CO: 1,2) [3]

Q2. Discuss the significance of following terms while keeping in mind the reference point of computational systems and their biological interpretations with a suitable example of each:

(a) Stoichiometry Matrix (b) Network Motifs

(c) Electronic Cell (d) Input Function (Repressor) (CO: 2-4) [2*4=8]

Q3. Elaborate various computational methods available for protein-protein interaction analysis. Discuss phylogenetic profile method for a set of 10 proteins where phylogenetic properties could be organized in two different groups (4 and 6 proteins respectively). (CO: 3,4) [5]

Q4. Realize the importance of XML in computational systems biology. Discuss how XML has evolved into various specific markup languages for the analysis of regulatory network data? Generate SBML code for a cellular model where at least 5 species are involved in a single compartment and dissociation constant is also playing an important role to catalyze the two reactions involved in the same compartment. (CO: 4-5) [1+2+4=7]

Q5. What is STRING? On which basis it is annotating biological networks? Explain the working of STRING in simple steps. For a set of 100 proteins if you want to analyze based upon 3-4 functional groups then which method will be more appropriate. How you will interpret the results for those functional groups? (CO: 3-5) [1+1+1+3+1=7]

Q6. Justify the role of omics cascade in genotype to phenotype consortium. Highlight the specific role of signal transduction and metabolic pathways with an example of each to accomplish this cascade. (CO: 2, 4, 5) [5]