JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2022

MSc-IV Semester (BT)

COURSE CODE: 20MSWBT433 MAX. MARKS: 25

COURSE NAME: Computational Systems Biology

COURSE CREDITS: 2 MAX. TIME: 1 Hour 30 Min

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

Q1. Evaluate the significance of network motifs in biological networks. If a 3 node motif occurs 15 times in a network however there are 7 more network motif types of 3 node occurring with an equal frequency as 10 each, then what will be the subgrapgh concentration of that motif (having 15 frequency). [2+3]

Q.2. In Erdos-Renyi (ER) model of networks if number of nodes are 30 and number of edges are 76, then what will be the probability of each edge position to be occupied? Discuss the significance of degree in networks. How this parameter can be correlated with the biological entities involved in transcriptional regulatory networks? [2+1+2]

Q.3. Give a comparative analysis of coherent and incoherent type motifs in a network. Give an example of each to propose their respective significance in a real biological system observed through experiments. [4]

Q.4. Discuss the importance of input function in gene regulatory networks and pathways. What will be parametric conditions for activators and repressors for this input function? Explain with their respective mathematical and graphical representations. [6]

Q.5. How the expression level of a particular gene may be correlated with multiple entities in a TRN? Explain with a real biological example where actual hierarchy of TRNs can be utilized. [5]