JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

MAKEUP EXAMINATION- 2025

M. Tech. - Ist Semester (BT)

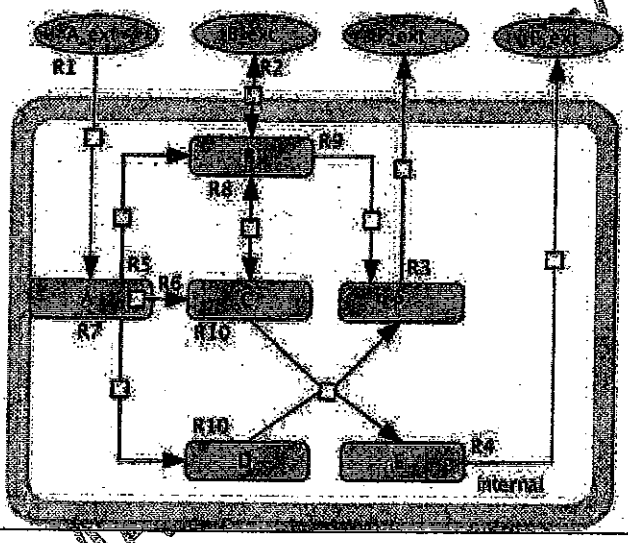
COURSE CODE (CREDITS): 18M1WBT133 (3) MAX. MARKS: 25

COURSE NAME: Advances in Computational System Biology

COURSE INSTRUCTORS: Dr. Raj Kumar MAX. TIME: 1 Hour 30 Min

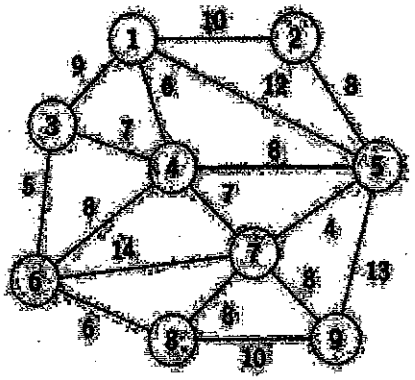
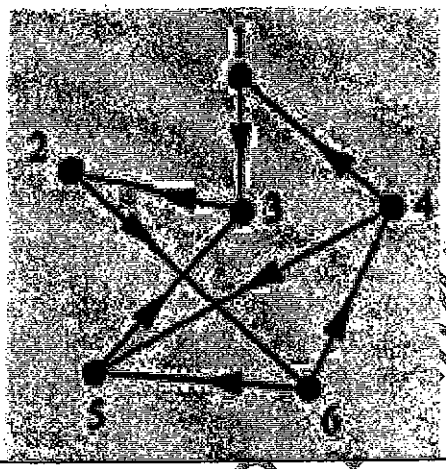
Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	Marks
Q1.	Calculate the stoichiometric matrix for the following network and its stoichiometric analysis: 	5
Q2.	An external signal, Signal, binds to and activates a receptor protein, Receptor. The active Receptor then phosphorylates a cytoplasmic protein, Protein A, which converts it into its active form. Next, the active Protein A acts as an enzyme, phosphorylating a second protein, Protein B, thereby activating it. Finally, the active Protein B translocates into the nucleus and binds to a specific region of DNA, promoting the transcription of the Target Gene. Represent Process Description of the above pathway using SBGN.	5
Q3.	Calculate the minimum spanning tree for the following graph using Kruskal's Algorithm.	5

30

1

		
Q4.	Calculate the adjacency matrix for the given graph: 	4
Q5.	Describe the design and function of a bistable toggle switch in synthetic genetic circuits. Provide an example of its application.	3
Q6.	Short notes in context to biological networks: a) Emergent properties b) Modularity c) Feedback mechanism	1 × 3 = 3