

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
TEST -3 EXAMINATIONS-2023

M.Tech-I Semester [BT]

COURSE CODE (CREDITS): 18M1WBT133 (3)

MAX. MARKS: 35

COURSE NAME: Advances in Computational Systems Biology

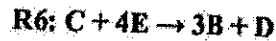
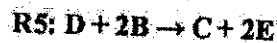
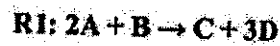
COURSE INSTRUCTORS: Dr. Tiratha Raj Singh

MAX. TIME: 2 Hours

*Note: All questions are compulsory. Marks are indicated against each question in square brackets. The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems.*

**Q1.** Discuss the role of systems biology in future expansion of science and technologies. Discuss your viewpoint through a real life example where principles of systems biology could be utilized to solve future serious issues in our society, be it a disease or technology development. [5]

**Q.2.** What is Stoichiometry matrix? Explain its role in metabolic networks. For a given set of 6 reactions, fabricate the Stoichiometry matrix: [5]



**Q.3.** Discuss in details the phylogenetic profiling method with an example where 7 different species (*assume from your side but from different lineages*) are involved. Plot the study with reference to PPIs and finally conclude with its application in the involved species. [5]

**Q.4.** Provide a technical discussion on following topics with reference to biological systems. Discuss their respective application parts also. [2.5\*4=10]

- (a) Petri Nets and modelling of biological systems (b) Metabolic networks  
(c) Dynamicity of regulatory networks (d) JAK-STAT pathway and its importance

**Q.5.** What is E-cell? Discuss its modules, implication and characteristics. Describe how this project was a revolutionary step in the growth of biological systems scenerio? [5]

**Q.6.** What are PPIs? Realize the significance of PPIs in biological systems. Discuss in brief various experimental and computational methods available for the characterization and analysis of PPIs. [5]