JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT TEST-3 EXAMINATION DECEMBER 2018

Ph.D. (Bioinformatics) Ist Semester

COURSE CODE: 18M1WBT133

MAX. MARKS: 35

COURSE NAME: Advances in Computational Systems Biology

COURSE CREDITS: 3

MAX. TIME: 2HR

Note: All questions are compulsory. Carrying mobile phone during examinations will be treated as a case of unfair means.

Q1. How is chemotaxis viewed as part of signal transduction pathways? Explain the pathway of chemotatic response in bacteria with the help of a diagram. What is a scatchard plot and how will the scatchard plot will be for a typical chemotaxis response?

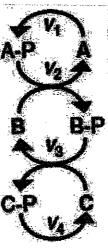
5 Marks (CO III)

Q2. For the following reactions write the differential equations and stochiometric matrix.

Aspartate Aspartyle Asa Aspartyle Asa Aspartyle Asa Aspartate (Asp) (Asp

Q3. What is this pathway representative of? Explain with examples the importance of such pathways.

3 Marks (CO IV and V)



Q4. What are the levels of abstraction in metabolic network? What are the different layers of information required in genome scale metabolic network reconstruction?

5 Marks (CO IV)

Q5. Describe the following briefly:

2x5=10 Marks (CO IV and V)

- a. Flux cone
- b. Constraint based modeling
- c. Amplification in signal transduction
- d. Bipartite graph
- e. GPCR

Q6. For the following pathway, draw the reaction as two graphs, one with respect to reactants and another with respect to reactions. What is the name of this pathway? Write the differential equations and the stochiometric matrix for these reactions.

6 Marks (CO V)

glyceraldehyde-3-phosphate + NAD \rightarrow 1,3-diphosphoglycerate + NADH

- 1,3-diphosphoglycerate → 2,3-diphosphoglycerate
- 2,3-diphosphoglycerate → 3-phosphoglycerate
- 1,3-diphosphoglycerate + ADP → 3-phosphoglycerate + ATP

3-phosphoglycerate → phosphoenolpyruvate

Phosphoenolpyruvate + ADP -- pyruvate + ATP

Pyruvate + NADH → lactate + NAD