

**M.S. IN BIOTECHNOLOGY
(MSBOBI/MSBOCC/MSBOMM)**

Term-End Examination

00234

June, 2015

MBOI-003 : INTRODUCTION TO SYSTEMS BIOLOGY

Time : 3 hours

Maximum Marks : 100

Note : (i) *Section I is compulsory.*

(ii) *Section II : Question 2 is compulsory. Answer any four questions from Q no. 3 to Q no. 8.*

(iii) *Assume suitable data wherever required.*

(iv) *Draw suitable sketches wherever required.*

(v) *Italicized figures to the right indicate maximum marks.*

SECTION I

1. Answer the following questions :

(a) What is a biological network ? Describe the different types of biological networks studied. 3+7

(b) Describe the two systems biology approaches used for studying any given biological system. 10

(c) Explain the following with the help of a diagram :

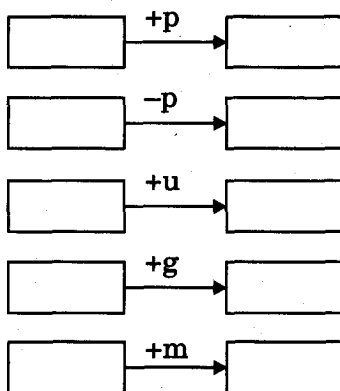
$$4 \times 2 \frac{1}{2} = 10$$

- (i) Path in a graph
- (ii) Degree of a node
- (iii) Cyclic graph
- (iv) Directed graph

SECTION II

Question no. 2 is **compulsory**. Answer any **four** questions from questions no. 3 to 8.

2. Describe any two bioinformatics methods for predicting protein-protein interactions. 14
3. Write a note on KEGG database and explain the given symbols represented in the KEGG graph given below : 7+7



4. Comment on the role of phosphorylation in signal transduction. 14
5. Describe JAK-STAT pathway with the help of a neat diagram. 14
6. Write a note on different interaction/pathway databases. Describe any two data formats in which interaction data is stored. 6+8
7. What is a graph ? Which properties of graph are studied to understand the behaviour of a particular biological system ? 4+10

8. Calculate the average degree and clustering coefficient of the network given below. Comment on the network using the calculated values of the parameters.

14

