

**M. Sc. Bioinformatics Sem.-III (2013 Course) (Choice Based Credit  
Systems) : WINTER - 2018**  
**SUBJECT : SYSTEMS BIOLOGY**

Day : Monday  
Date : 29/10/2018

**W-2018-1262**

Time : 02.00 PM TO 05.00 PM  
Max. Marks : 60

**N. B. :**

- 1) **Q. No. 1 and Q. No. 5 are COMPULSORY.** Out of remaining attempt **ANY TWO** questions from each section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer books.

**SECTION – I**

- Q. 1** Explain briefly : (10)
- a) Biological systems
  - b) Modeling types
  - c) Model constraints
  - d) Logistic model
  - e) Stoichiometry
- Q. 2** Answer the following: (10)
- a) Give an overview on qualitative modeling.
  - b) Give an overview on physical process modeling.
- Q. 3** Write short notes on: (10)
- a) Linear and non-linear models
  - b) Predator-prey models
- Q. 4** Explain in detail numerical integration, stability and stillness. (10)

**OR**

Explain in detail differentiation, ODEs and PDEs.

**SECTION – II**

- Q. 5** Explain briefly : (10)
- a) Model validation
  - b) Models in real space
- Q. 6** Answer the following: (10)
- a) What are discrimination models?
  - b) What are dynamic validations techniques? Explain.
- Q. 7** Write short notes on: (10)
- a) Complexity and robustness analysis
  - b) Modularity based studies
- Q. 8** Write in detail on machine-learning based modeling techniques. (10)

**OR**

How to utilize non-linear equations in systems biology?

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