M.Sc. (Part–II) Semester—III (CBCS Scheme) Examination

CHEMISTRY (New)

Paper–XI

(Physical Chemistry–I)

Time : Three Hours] [Maximum Marks : 80

N.B. :— (1) All questions are compulsory and carry equal marks.

(2) Use of log-table and scientific calculator is permitted.

1. (a) What are different precursor methods ? Discuss co-precipitation as precursor to solid state reaction. 6

(b) What is crystal defects ? Explain the thermodynamics of Schottky and Frenkel defects. 6

(c) Write a short note on kinetics of solid state reaction. 4

OR

(p) Describe various experimental procedures for different methods of solid state synthesis. 6

(q) Explain importance of intrinsic and extrinsic defects in crystal with example. 6

(r) Describe how vacancies are important for the different crystal defects. 4

2. (a) Explain band theory of solids. How will you differentiate metals, semiconductors and insulators on the basis of it ? 6

(b) Explain the effect of temperature on magnetic properties of substance on the basis of Curie-Weiss law. 6

(c) Discuss colons in inorganic solids. 4

OR

(p) Write notes on :

(i) Intrinsic semiconductor

(ii) Extrinsic semiconductor

(iii) Doping of semiconductor. 6

(q) How is magnetic moment related to structure of magnetic material ? Discuss its application. 6

(r) Discuss the structure and properties of magnetic materials. 4

3. (a) Discuss kinetics and thermodynamics of glass formation. 6

(b) Discuss phase diagram of iron-carbon system. 6

(c) Explain carbon-carbon and hybrid composites. 4

OR

(p) What are metallic glasses ? Explain their properties. 6

(q) Discuss properties and applications of ferrous and non-ferrous alloys. 6

(r) Discuss ionic conductivity of glasses. 4

4. (a) Discuss critical energy transfer distance and energy transfer efficiency with example. Give their analytical significance. 6

(b) What is photochemical reaction ? Explain photodimerisation and photoisomerisation reactions with example. 6

(c) Give brief account on chemiluminescence. 4

OR

(p) Explain fluorescence and concentration quenching. How it is different from excimer and exciplex emission quenching ? 6

(q) Write brief notes on :

(i) Photochemistry of environment

(ii) Green house effect. 6

(r) Discuss radiative and non-radiative transitions. 4

5. (a) Explain preparation and characterisation of 1-2-3 and 2-1-4 materials. 6

(b) Discuss growth techniques, properties and application of thin films. 6

(c) Explain in brief BCS theory. 4

OR

(p) Give an account on MOCVD, sol-gel and sputtering technique for preparation of thin film. 6

(q) Define high Tc and low Tc superconductor ? Discuss their applications. 6

(r) What are thin films ? Discuss their properties and applications. 4