

M.Sc. - I (Chemistry) (NEP Pattern) Semester-II
02MSCCH03 - Paper-III : Physical Chemistry-II

P. Pages : 2

Time : Three Hours



GUG/S/25/15352

Max. Marks : 80

1. a) Discuss the applications of molecular orbital theory of H_2^+ molecule. 8

b) Discuss HMO theory with application to ethylene and cyclobutadiene 8

OR

c) Explain Russel-Sander's coupling. 4

d) What is term separation energies for d^n configuration? 4

e) Using perturbation theory obtain ground state energy of helium atom. 4

f) What is hybridization? Write its salient features and draw BMO and ABMO. 4

2. a) Give the comparison of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics. Derive the expression for Maxwell-Boltzmann statistic. 8

b) Discuss Debye-Huckel theory for activity coefficient of electrolytic solution. 8

OR

c) Derive an expression for Stirling approximation. 4

d) Obtain the expression for entropy of mixing and enthalpy of mixing of non-ideal solution. 4

e) Discuss the conservation of mass and energy in closed and open system. 4

f) Describe the thermodynamic criteria for non-equilibrium states. 4

3. a) Discuss kinetics of solid state reactions. Give their application. 8

b) Discuss thermodynamics in Schottky defects with suitable examples. 8

OR

c) Write a short note on:
i) Perfect crystal ii) Imperfect crystal 4

d) Write a note on colour centres. 4

e) Explain co-precipitation as a precursor to solid state reaction. 4

f) Describe B. C. S. theory. 4

4. a) Explain nuclear shell model? What are the evidence in favour of this model? Give the advantages of this model? 8
- b) Discuss about : 8
- i) Radiometric titration ii) Isotopic dilution analysis.

OR

- c) Give the application of neutron activation analysis technique. 4
- d) Discuss liquid drop model. 4
- e) Discuss G. M. counter. 4
- f) Explain ionization chamber counter. 4
5. a) What is Zeeman splitting? 2
- b) Explain Sp hybridization. 2
- c) Define ionic strength with example. 2
- d) What is Le-Chatelier principle of chemical equilibrium. 2
- e) What is line defect? 2
- f) Explain p-n Junction. 2
- g) What is thermonuclear reaction? 2
- h) Give application of liquid drop model. 2
