

Seat No. : _____

JG-125

June-2022

M.Sc., Sem.-II

409 : Chemistry

(Physical Chemistry)

Time : 2 Hours]

[Max. Marks : 50

Instruction : Section-II is compulsory.

Section – I

Answer any **three** of the following questions : (14 marks each)

1. (a) Derive the expression for Maxwell-Boltzmann statistics. 7
(b) Derive an equation for the translational partition function. Discuss the physical significance of partition function. 7
2. (a) Derive the expression for Fermi-Dirac statistics. 7
(b) Explain in brief the thermodynamic probability, permutation and combinations. 7
3. (a) Discuss the mechanism and kinetics of free radical chain polymerization. 7
(b) Explain in brief the thermodynamics of polymer solution. 7
4. (a) Name the methods used for the determination of molecular weight of polymers. Discuss viscosity method for determining molecular weight of a polymer. 7
(b) What is cationic polymerization ? Discuss the kinetics of cationic polymerization. 7
5. (a) Explain in brief about nuclear radius and nuclear binding energy. 7
(b) Discuss the liquid drop model of atomic nucleus. 7

6. (a) Discuss in brief about reaction cross section, spallation and fragmentation. 7
(b) Discuss the shell model of atomic nucleus and show how it explain the magic numbers. 7
7. (a) Explain the conductometric method used to determine the dissociation constant of a monobasic acid. 7
(b) Explain how the activities of solutes can be determined from the activities of the solvent. 7
8. (a) Explain the potentiometric method to determine the thermodynamic dissociation constant of a monobasic acid. 7
(b) Write note on the rate of charge transfer. 7

Section – II

9. Answer the following question : (One mark each) 8
- (1) Why fusion reactions are known as thermonuclear reactions ?
 - (2) What is glass transition temperature ?
 - (3) Define thermodynamic probability.
 - (4) What is the difference between nuclear reaction and a chemical reaction ?
 - (5) What is intrinsic viscosity ?
 - (6) What is the effect of temperature on partition function ?
 - (7) What is meant by limiting molar conductivity ?
 - (8) What is the effect of dilution on specific conductance ?
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