

PARUL UNIVERSITY
FACULTY OF APPLIED SCIENCE
M.Sc. Winter 2018-19 Examination

Semester: 1
Subject Code: 11205103
Subject Name: Physical Chemistry-I

Date: 05/12/2018
Time: 10.30 am to 1.00 pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

- Q.1. A) Answer the following: (08)**
- (a) State and explain the postulates of the Kinetic Molecular Theory of gases.
 - (b) Define the term: Degrees of Freedom of a gas. State the different types of degrees of freedom and explain any one of them giving suitable example.
- Q.1. B) Answer the following questions: (ANY TWO)**
- (a) 1. Calculate the various degrees of freedom for Benzene. (04)
 2. Write the equation of the Maxwell's Distribution law for molecular velocities and signify the terms involved in it.
 - (b) Define the term: The coefficient of viscosity of a gas. Give the relationships between the mean free path (λ) and the coefficient of viscosity (η) of the gas. What is the effect of temperature on η ? (04)
 - (c) State the Kinetic Gas equation. Derive the gas laws viz. Boyle's law and Charles' law from the Kinetic Gas equation. (04)
- Q.2. A) Answer the following:**
- (a) 1. What are the Complex reactions? Explain. (04)
 2. What are the shortcomings of the Hinshelwood theory ?
 - (b) Explain Lindemann theory of unimolecular reactions. (04)
- Q.2. B) Answer the following questions: (ANY TWO)**
- (a) 1. Write down the types of Flow Systems. (03)
 2. What is the Steady state approximation?
 3. Write down the principle of the Flash Photolysis.
 - (b) Explain the Stopped-flow method with schematic diagram. (03)
 - (c) Write the rate laws for consecutive, opposing and parallel reactions. (03)
- Q.3. A) Answer the following: (08)**
- (a) Give the classification of surfactants with suitable examples.
 - (b) Write about the Thermodynamics of Micellization.
- Q.3. B) Answer the following questions: (ANY TWO)**
- (a) 1. Explain the reverse micelle with suitable diagram. (04)
 2. What is meant by Micro emulsions? Explain.
 - (b) Write a note on applications of surfactants. (04)
 - (c) Define the term: CMC. Discuss the factors affecting CMC. (04)
- Q.4. A) Answer the following:**
- (a) 1. Define the following terms with suitable examples: Thermoset Polymers & Inorganic Homochain Polymers (04)
 2. Give the difference between addition polymerization and condensation polymerization.
 - (b) Write short note on Bulk polymerization technique. (04)
- Q.4. B) Answer the following questions: (ANY TWO)**
- (a) 1. Write the structures of the repeat units for the following polymers: Polymethyl methacrylate & Polyethers (03)
 2. Define the term: Degree of polymerization. What is its relationship with the molecular weight of a polymer?
 3. Equal masses of polymer molecules with $M_1 = 10,000$ and $M_2 = 100,000$ are mixed. Calculate \bar{M}_w .
 - (b) What are the two general approaches to prepare Step-growth polymers? Write the step-growth polymerization reactions for the synthesis of polyesters and polyamides. (03)
 - (c) Discuss about the Free Radical Chain Polymerization reaction. (03)