Seat No: _____ Enrollment No: _____

PARUL UNIVERSITY

FACULTY OF APPLIED SCIENCE

M.Sc. Winter 2018-19 Examination

Semester: 1 **Date: 05/12/2018**
Subject Code: 11205103 **Time: 10.30 am to 1.00 pm**
Subject Name: Physical Chemistry-I **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 $\overline{M}_w$.
(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)**