SEMESTER EXAMINATION-2021
CLASS – MSC I SEM, SUBJECT- CHEMISTRY
PAPER CODE: MCH-C103, PAPER TITLE:GENERAL PHYSICAL CHEMISTRY

Time: 3 hour **Max. Marks: 70**
Min. Pass: 40%

Note: Question Paper is divided into two sections: **A and B.** Attempt both the sections as per given instructions.

SECTION-A (SHORT ANSWER TYPE QUESTIONS)

Instructions: Answer any five questions in about 150 words each. Each question carries six marks. (5 X 6 = 30 Marks)

Question-1: What are third order reactions. Derive a rate law for a third order reaction when concentration of one reactant is determining reaction rate.
Question-2: What are number average, weight average and polydispersity index of polymers?
Question-3: Discuss Taft's linear free energy relationship. How it is different from Hammett's relationship.
Question-4: Discuss the process of fluorescence with the help of Jablonskii diagram.
Question-5: What are the main postulates of Collision theory for reaction rates. Derive an expression for unimolecular reactions.
Question-6: Derive Bronsted Bjerrum equation. Explain effect of ionic strength on reaction rates based on it.
Question-7: Discuss the kinetics of chain reaction with the help of an example.
Question-8: What do you understand by acid-base catalyzed reaction? Discuss the mechanism of such type of reactions.
Question-9: Discuss stopped flow method to study the kinetics of fast reactions.
Question-10: Differentiate between atactic, isotactic and syndiotactic polymers.

SECTION-B (LONG ANSWER TYPE QUESTIONS)

Instructions: Answer any FOUR questions in detail. Each question carries 10 marks. (4 X 10 = 40 Marks)

Question-11: Discuss the potential energy surfaces for the reaction between H_2 molecule and H atom. Also discuss the concept of COL and contour diagram.
question-12: Derive the kinetic equation for the determination of rates of consecutive and opposing reaction. How the concentration of reactant and product changes with time in these reactions?
Question-13: Write a note on reactions in solutions. Discuss the factors affecting the rates in solution.
Question-14: Write notes on:

a) Double sphere model
b) Photophysical kinetics of Unimolecular reactions.

Question-15: Explain Hammett's equation. Starting from this equation derive the relation between free energy of activation of two reaction series. What are the limitations of Hammett equation?

Question-16: Discuss light scattering and sedimentation equilibrium method for determination of molecular weight of polymers.

Question-17: Write notes on:

a) Degree of polymerization and length of polymer chains
b) Addition and condensation polymerization

Question-18: Derive Michaelis-Menten equation. Explain the effect of substrate concentration on reaction rates using this equation. How will you determine the value of Km.

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