2022

M.Sc.

Second Semester

CORE – 08

CHEMISTRY

Course Code: MCHC 2.41

(Physical Chemistry – III)

Total Mark: 70 *Pass Mark: 28*

Time: 3 hours

Answer five *questions, taking* one *from each unit.*

UNIT–I

1. (a) Discuss in detail collision theory of bimolecular reactions. Write its limitation. 5+1=6
   (b) Using the CTST explain the equilibrium hypothesis.
   (c) Explain the single sphere activated complex model. 4

2. (a) Using the CTST explain the statistical mechanics and chemical equilibrium. 6
   (b) Write a note on collision in solution.
   (c) Explain the rate equation for transition state theory using derivation 2. 3

UNIT–II

3. (a) What are the main characteristic properties of a catalyst? 4
   (b) Write a note on acid base catalysis. 4
   (c) What is enzymes catalysis? Discuss the expression on the influence of substrate concentration on the reaction rate. 6

4. (a) Write short notes on the following: 4×2=8
      (i) Reaction between acetone and iodine
      (ii) Salt effects on acid base catalysis

(b) How is Arrhenius intermediate concept applied to a reaction involving catalyst and substrate? 6

UNIT–III

5. (a) What are unimolecular reactions? Discuss the Lindemann mechanism. 1+5=6
   (b) Using Van't Hoff equation explain pressure effect and volume of activation. 5
   (c) What is the role of intermolecular force in dissolution of table salt? 3

6. (a) Write an account on the influence of ortho- and meta-directing groups on reaction kinetics. 3+3=6
   (b) Derive the Hamlet equation. 5
   (c) Explain the double-sphere model of ionic reactions. 3

UNIT–IV

7. (a) What are chain reactions? Explain the reaction between hydrogen and chlorine under thermal reaction. 5
   (b) Explain the pyrolysis of ethane. 5
   (c) Write a note on free radical mechanism. 4

8. (a) Discuss the polymerization reactions base on molecular mechanisms. 6
   (b) Define explosive reactions. Discuss the combustion between hydrogen and oxygen. 5
   (c) Write one comparison of the mechanisms of hydrogen and halogen reactions. 3

UNIT–V

9. (a) Taking specific example, explain the two types of polymer based on polymerization. 4
   (b) Show how molar masses of polymer can be determined using viscometry method. 5

(c) What is meant by cationic polymerization? Give the kinetics of cationic polymerization. 1+4=5

10. (a) Define the term tacticity. Write short notes on the following: 1+3=4
    (i) Atactic polymers
    (ii) Syndiotactic polymers
    (iii) Isotactic polymers
    (b) Show how to determine the molar masses of a polymer molecule using osmometry method. 5
    (c) What is meant by anionic polymerization? Give the kinetics of anionic polymerization? 1+4=5
