## May 2025
## 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* <u>five</u> *questions, taking* <u>one</u> *from each unit.*

### UNIT–I

1.  (a)  Write a note on generalised kinetic theory.    5
    (b)  Give the thermodynamic formulation of CTST.    7
    (c)  Which factors determine the reaction rates in solution?    2

2.  (a)  Derive the rate equation for transition state theory using derivation 1.    5
    (b)  Discuss the double sphere model for activated complex.    4
    (c)  Explain the effect of ionic strength.    5

### UNIT–II

3.  (a)  Explain the Lineweaver-Burk plot.    4
    (b)  What are acid functions? Explain.    7
    (c)  Write the Michaelis-Menten equation.    3

4.  (a)  With the help of a neat diagram, explain the activation energies for catalysed reaction.    4
    (b)  Give the mechanism of acid base catalysis taking two extreme cases, $k_2 \ll k_{-1}[B]$ and $k_{-1}[B] \ll k_2$.    5
    (c)  Write a note on catalytic activity and acid-base strength.    5

### UNIT–III

5.  (a)  Explain the combination and disproportionation reactions.    4

(b) Write a note on each of the following:         2×2=4
    (i) Intermolecular energy transfer
    (ii) Laser induced unimolecular reactions

(c) Explain the pressure effect and volume of activation using van 't Hoff equation.     6

6. (a) Write a note on Slater's treatment.     3
  (b) Explain the Marcus extension of RRK treatment.     4
  (c) Discuss the ion-dipole and dipole-dipole reactions.     4
  (d) Give the theory of unimolecular reactions.     3

## UNIT–IV

7. (a) Discuss the mechanism of cationic polymerisation.     6
  (b) Explain the pyrolysis of acetaldehyde.     5
  (c) What is autocatalysis? Explain.     3

8. (a) Give a detailed account on the kinetics of HBr reaction.     4
  (b) Explain the kinetic aspects of polymerisation reactions.     5
  (c) Write a note on each of the following:     2½×2 =5
    (i) Kinetic chain length
    (ii) Free radical mechanisms

## UNIT–V

9. (a) Write a note on each of the following:     2×2=4
    (i) Graft polymers
    (ii) Electrically conducting polymers

  (b) Give a detailed account of polymerisation reactions.     5
  (c) Explain the sedimentation process for determining the molar mass of polymer.     5

10. (a) Using light scattering method, determine the molar mass of polymer.     5
  (b) Write the kinetics of anionic polymerisation.     5
  (c) Explain the calculation of average dimensions of various chain structures.     4

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