

10. (a) Discuss the decomposition mechanism of ozone and determine the rate of expression. 3
- (b) Discuss the Hinshelwood theory of unimolecular reaction and its limitations. 3+3=6
- (c) Obtain the rate expression of the thermal decomposition of N_2O_5 5

PG (CBCS) EVEN SEMESTER EXAMINATION, 2023

CHEMISTRY

4th Semester

Course No. : CHMCC - 403 (C)

(Physical Chemistry-IV)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

(Answer five questions, selecting one from each unit)

UNIT-I

1. (a) Explain different types of photophysical pathways mentioning both radiative and non-radiative transitions using the Jablonski diagram. 5
- (b) Write short notes on the following:
- (i) Excimer and Exciplex formation
- (ii) Static and Dynamic Quenching
- (iii) Excitation Energy Transfer 3x3=9
2. (a) Derive Stern-Volmer equation 5
- (b) Write short notes on the following:
- (i) Fluorescence Resonance Energy Transfer
- (ii) Photoinduced Electron Transfer

(2)

(iii) Sphere of Effecting Quenching 3x3=9

Unit -II

3. (a) Explain the effect of solvent polarity on emission spectra with the help of the Jablonski diagram. 5
(b) Explain the effect of solvent mixtures on emission spectra taking one specific example. 5
(c) Write a short note on probe-probe interaction taking one specific example. 4
4. (a) Derive the Lippert equation and discuss one application Lippert equation. 7+3=10
(b) Explain the effect of viscosity on the emission intensity of fluorophores taking one specific example. 4

Unit -III

5. (a) What are the characteristic features of the ordinary dielectrics? How ferroelectrics are different from ordinary dielectrics? 2+3=5
(b) Explain the ferroelectricity in BaTiO₃? 4
(c) Demonstrate the Hall effect and explain how to separate the 'n' and 'μ' by combined measurement of conducting and Hall voltage. 5
6. (a) Discuss the possible reason for the change in polarization of ferroelectric material by the application of an electric field. 4

(3)

- (b) Write short notes on
(i) Organic semiconductor
(ii) Organic charge transfer complex 3+3=6
(c) What is pyroelectric materials? Explain the development of polarization in pyroelectric materials by taking one specific example. 4

Unit -IV

7. Write the assumption of a simple cell model of liquid. How the cell model is used for the calculation of the configurational partition function? 4+10=14
8. (a) Write short notes on
(i) induced energy
(ii) dispersion energy 3+3=6
(b) Discuss the problem of the communal free energy and entropy of the liquid. 8

Unit-V

9. (a) Discuss the Lindemann theory of unimolecular reaction. Obtain the rate expression of the unimolecular reaction. Discuss the effect of concentration or pressure on the order of the reaction. What are the limitations of the Lindemann theory of unimolecular reaction? 2+3+2+3=10
(b) Discuss the thermal decomposition of acetaldehyde and derive the rate expression of the decomposition reaction. 4

(Turn Over)