

18. (a) Derive Stern Volmer equation.
- (b) Describe the stopped flow method and flash photolysis method in the study of fast reaction kinetics. (5+10)
19. Derive the following relations
- (a) $S = K \ln W$
- (b) $PV = nRT$ for ideal monoatomic gas using the molecular partition function
- (c) Sackur – Tetrode equation (3+6+6)
20. Write short notes on
- (a) Liquid junction potential
- (b) Fuel cells
- (c) Reverse Micelles (5+5+5)

S.No. 7402

PN 15 CH 3

(For candidates admitted from 2015–2016 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Chemistry

PHYSICAL CHEMISTRY

Time : Three hours

Maximum : 100 marks

PART A — (10 × 2 = 20)

Answer ALL questions.

- Assign point group for (a) NH_3 (b) PF_5 (c) Allene (d) CH_4
- What is steady state approximation?
- What is the eigen value if e^{ikx} is an eigen function of the operator d/dx ?
- Determine the term symbol for the ground state of Ni which has the outer electronic configuration $3d^8$
- Write any two applications of LASER.
- Define G value in radiation chemistry.

7. What are the different ways of defining chemical potential in molecular thermodynamics?
8. What is ergodic hypothesis?
9. What is Wien effect?
10. What is Physisorption?

PART B — ($5 \times 7 = 35$)

Answer ALL questions, Choosing either (a) or (b).

11. (a) Draw and explain the various symmetry elements present in water molecule. Find its point group. (5+2)

Or

- (b) Discuss Kinetic isotope effect.

12. (a) Write down the postulates of quantum mechanics.

Or

- (b) Set up and Solve the Schrodinger equation to get the energy of a particle in 3D box.

13. (a) Draw Jablonski diagram and explain the various photophysical processes.

Or

- (b) Differentiate radiation chemistry and photochemistry.

14. (a) How will you determine the activity coefficient of electrolytes by EMF method?

Or

- (b) Compare Bose – Einstein and Fermi Dirac Statistics with Boltzmann Statistics.

15. (a) Derive Butler – Volmer Equation.

Or

- (b) Deduce Langmuir adsorption isotherm.

PART C — ($3 \times 15 = 45$)

Answer any THREE questions.

16. (a) Construct the character table for C_{2v} point group.

- (b) Write briefly on absolute reaction rate theory. (7+8)

17. (a) Explain Photoelectric effect.

- (b) Set up and solve the Schrodinger wave equation for a particle in one dimension box. Normalize the wave function. (3+12)