

M.Sc. DEGREE END SEMESTER EXAMINATION - OCTOBER 2025**SEMESTER – 3: CHEMISTRY/PHARMACEUTICAL CHEMISTRY****COURSE: 24P3CHET11/24P3CPHT11 - PHYSICAL CHEMISTRY III***(Regular 2024 Admission)*

Time: Three Hours

Max. Weights: 30

PART A**Answer any 8 questions****Weights: 1**

1. B-Galactosidase enzyme catalyzed hydrolysis of Lactose at 298 K has Michaelis constant of 0.065 mol L^{-1} . At a substrate concentration of 0.75 mol L^{-1} , the reaction rate is found to be $3.15 \text{ mol L}^{-1} \text{ s}^{-1}$. Calculate the maximum Velocity. (U, CO2)
2. Explain the principle of flash photolysis. (U, CO1)
3. What is Goldfinger-Letort- Niclausse rule? (U, CO1)
4. Explain the influence of pressure on unimolecular gas phase reactions. (U, CO1)
5. Write a note on micelles. (U, CO 2)
6. What is the principle of Auger electron spectroscopy? (U, CO 2)
7. Explain the adsorption isotherm of physisorption using Langmuir adsorption isotherm. (U, CO 2)
8. Calculate the ionic strength of a solution which is 0.1 molal in NaCl and 0.01 molal in CaCl_2 . (U, CO1)
9. Describe about Debye-Falkenhagen effect. (U, CO1)
10. Write a note on deviations from DHLL. (U, CO1)

(1 x 8 = 8)**PART B****Answer any 6 questions.****Weights: 2**

11. Discuss the first and second explosion limits in $\text{H}_2\text{-O}_2$ reaction. (U, CO1)
12. Write a note on Eley-Rideal mechanism. (U, CO1)
13. Explain the origin of Donnan membrane equilibrium. How does it interfere with the determination of molecular mass of macromolecules? (U, CO2)
14. Equal masses of polymer molecules with $M_1=10000$ and $M_2= 100000$ are mixed. Calculate the number average molecular mass and weight average molecular mass. (U, CO2)

15. For a unimolecular gas reaction, the pre-exponential term is $3.7 \times 10^{11} \text{ dm}^3/\text{mol/s}$ at 300K. Calculate the entropy of activation. What would be the change in entropy of activation if the unit of the pre-exponential factor was converted from $\text{dm}^3/\text{mol/s}$ to $\text{cm}^3/\text{molecule/s}$. (U, CO1)
16. Explain about the principle and applications of SERS in surface chemistry. (U, CO1)
17. Write a note on ion - association. (U, CO3)
18. Briefly describe about Drude and Nernst's electrostriction model. (U, CO3)
- (2 x 6 = 12)**

PART C

Answer any 2 questions

Weights: 5

19. a) Distinguish between primary and secondary salt effect
 b) Explain the influence of solvent on reaction rates (U, CO1)
20. Derive BET theory of multilayer adsorption. How BET theory is used for the determination of surface area of adsorbent. (U, CO2)
21. Derive Debye Huckel limiting equation and discuss the validity of the law. (U, CO3)
22. Derive Michaelis-Menten equation and explain the pH and temperature dependence. (U, CO1)
- (5 x 2 = 10)**