M.Sc. DEGREE END SEMESTER EXAMINATION : OCTOBER 2022
SEMESTER 3 : CHEMISTRY / PHARMACEUTICAL CHEMISTRY
COURSE : **21P3CHET11 / 21P3CPHT11 : PHYSICAL CHEMISTRY III**
(For Regular - 2021 Admission)

Duration : Three Hours   Max. Weights: 30

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

1.	How will you explain the deviations observed in primary salt effect with more concentrated solutions?	(E, CO 1)
2.	What is the effect of polarity of a solvent on the rate of ionic reactions in solutions?	(U)
3.	How is the dimension of the cubic unit cell, Avogadro's number and density related to each other?	(R, CO 3)
4.	Define number-average molar mass and weight average molar mass of a macromolecule.	(U, CO 2)
5.	Write down the coordinates expression for structure factor and give its significances	(U, CO 3)
6.	What are the information obtained from a LEED pattern?	(U, CO 2)
7.	List any four factors that influence adsorption of a gas on a solid.	(U, CO 2)
8.	Apply the Bronsted – Bjerrum equation to predict the effect of increasing ionic strength of the medium on the hydrolysis of sugar catalyzed by weak acid.	(An, CO 1)
9.	For a given reaction at temperature T, the velocity constant, k is expressed as $k = A.\ e^{-27000k|T}$. Given, R = 2 cal mole $^{-1}$ K^{-1}. Calculate the value of energy of activation.	(A)
10.	Describe the selection rules for Surface Enhanced Raman Spectroscopy.	(U, CO 2)

(1 x 8 = 8)

PART B
Answer any 6 questions   **Weights: 2**

11.	Give the thermodynamic formulation of reaction rate based on TST	(U)
12.	The kinetics studies of decomposition of gaseous hydrogen iodide gave the values of specific reaction rates to be 3.517 x 10^{-7} and 3.954 x 10^{-2} at 556 K and 781 K. Calculate the energy of activation of the reaction	(A)
13.	Explain the criteria for 'spreading of one liquid on another'.	(U, CO 2)
14.	a) What are the advantages of the powder method over the rotating crystal method of crystal analysis b) The powder pattern of a crystalline material is said to its finger print. Explain	(U, CO 3)

15. Discuss briefly the Fourier synthesis of electron density in crystal structure analysis. What is its significances? (U, CO 3)

16. Derive Eyring equation using thermodynamic functions (An, CO 1)

17. Explain how pressure jump method determines relaxation time of a fast reaction? (U, CO 1)

18. Explain the principle and applications of Scanning Electron Microscopy in the study of surfaces. (A, CO 2)

(2 x 6 = 12)

PART C
Answer any 2 questions   **Weights: 5**

19. Derive the BET adsorption isotherm. Show that it approximate to Langmuir adsorption isotherm under limiting conditions. (A, CO 2)

20. What are liquid crystals? How are they classified? Name the first solid which showed the proprty of liquid crystal. Differentiate between smectic liquid crystal and nematic liquid crystal. What are cholesteric liquid crystal? (U, CO 3)

21. Illustrate Lineweaver-Burkmann plot? (E, CO 1)

22. Give an account of the four type of electrokinetic effects associated with colloidal systems? (R, CO 2)

(5 x 2 = 10)

OBE: Questions to Course Outcome Mapping

CO	Course Outcome Description	CL	Questions	Total Wt.
CO 1	Apply the principles of chemical kinetics in different types of reactions.	U	1, 8, 16, 17, 21	11
CO 2	Describe the chemistry of surfaces and its applications in colloids and macromolecules.	U	4, 6, 7, 10, 13, 18, 19, 22	18
CO 3	Explain the chemistry of crystalline solids	U	3, 5, 14, 15, 20	11

Cognitive Level (CL): Cr - CREATE; E - EVALUATE; An - ANALYZE; A - APPLY; U - UNDERSTAND; R - REMEMBER;