

**FINAL YEAR B.Sc. DEGREE EXAMINATION, MARCH/APRIL 2005**

Part III—Group X—Polymer Chemistry

Paper IV—PHYSICAL CHEMISTRY—II

(New Scheme from 1999 onwards)

Time : Three Hours

Maximum : 60 Marks

**Section A***Answer either (a) or (b) of each question and each question carries 2 marks.*

1. (a) Name the elements of symmetry.  
(b) How are extrinsic and intrinsic semiconductors distinguished?
2. (a) Distinguish between  $\bar{M}_n$  and  $\bar{M}_w$ .  
(b) What type of molecular mass is determined from viscosity measurements? Give the equation for determination of molecular mass from this technique.
3. (a) Define surface tension. How is it determined?  
(b) What are liquid Crystals? Explain.
4. (a) Distinguish between 1<sup>st</sup> order consecutive reactions and parallel reactions.  
(b) State Grothus-Draper law.
5. (a) Give the relationship between E and  $\lambda$ , in a Photochemical reaction.  
(b) If the wavelength of radiation of photon is 2000Å, find the value of E in the above equation.
6. (a) State and explain Einstein's law of photochemical equivalence.  
(b) Give the different methods for testing of a photochemical reaction.
7. (a) State Frank-Condon principle.  
(b) What is an anharmonic oscillator?
8. (a) Give the region of electromagnetic radiation.  
(b) Differentiate between Stroke's and anti Stroke's lines in Raman spectrum.
9. (a) What are combination bands?  
(b) What are d-d transitions?
10. (a) What are 'delta' and 'tau' values in NMR spectra?  
(b) What is isotopic abundance?

(10 × 2 = 20 marks)

**Section B***Answer either (a) or (b) of each question, and each question carries 4 marks.*

11. (a) Define surface tension. How is it determined?  
(b) What are liquid crystals? Explain.

Turn over

12. (a) The following data was obtained on the hydrolysis of methyl acetate at 25°C in the presence of 0.35 NHCL, which was used as a catalyst.

t (sec.)	0	1200	4500	7140	$\infty$
Alkalic used (ml)	24.36	25.85	29.32	31.72	47.15

from the above data show that the hydrolysis of methylacetate is a 1<sup>st</sup> order reaction.

- (b) Decomposition of benzene diazonium chloride was studied at a constant temperature by measuring the volume of N<sub>2</sub> evolved at various intervals of time. The following data was obtained :

Time (min.)	0	20	50	70	$\infty$
N <sub>2</sub> (ml)	0	10	25	33	162

From the above data show that the R<sub>x</sub> is 1<sup>st</sup> order.

13. (a) Write a short note on electronic spectra of polygamic molecule.  
 (b) Discuss the infrared spectra of molecules on the basis of harmonic oscillator model for diatomic molecules.
14. (a) Calculate the molar refraction of acetone at 20°C. The refractive index, n, of acetone is 1.3591 and the density is 0.7910g cm<sup>-3</sup> at 20°C. The molecular weight of acetone is 58.08.  
 (b) The molecular refraction for CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>, CH<sub>3</sub>CH<sub>2</sub>OH and CH<sub>3</sub>OH are 20.6, 12.9 and 8.3 respectively. Calculate the molecular refraction for CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>OH.
15. (a) Write a note on the common types of dissociation occurring in molecules when studying mass spectroscopy.  
 (b) Write a short note on the application of mass spectrometer in the determination of molar mass.

(5 × 4 = 20 marks)

### Section C

*Answer either (a) or (b) of each question, and each question carries 10 marks.*

16. (a) What is tyndal effect ? Discuss.  
 (b) What is interionic attraction theory ? Discuss the qualitative treatment of Debye-Huckel-Onsagar equation.
17. (a) Write a short note on different applications of colloids.  
 (b) Write a short note on different applications of Electrophoresis.

(2 × 10 = 20 marks)