



A-1294

M. Sc. (Sem.-I) (Reg. & Eve.) Examination

March/April – 2015

Chemistry : Paper - III

(Physical Chemistry)

Time : 3 Hours]

[Total Marks : 70

Instructions :

(1)

नीचे दृष्टावेक निशानीवाणी विगतो उत्तरवही पर अवश्य कभवी.  
Fillup strictly the details of signs on your answer book.

Name of the Examination :  
M. Sc. (Sem.-I) (Reg. & Eve.)

Name of the Subject :  
Chemistry : Paper - III

Subject Code No. : 1 2 9 4 Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

- (2) Attempt all the questions.
- (3) Figures to the right - indicate full marks.
- (4) Answer of all questions to be written in same answer books.

1 Attempt any three questions. 18

- (a) Describe osmometry technique for the determination of mol. mass of polymer. What do you understand by static and dynamic osmometer. What type of molecular weight is obtained from this method?
- (b) Name -different phase techniques for polymerization. Explain one technique giving its advantage and disadvantage.
- (c) Write note on stereochemistry of polymer.
- (d) State different type of viscosity. Intrinsic viscosity of PVP solution at 25 °C is 160 cm<sup>3</sup> g<sup>-1</sup>. Calculate concentration of polymer solution in water whose relative viscosity is 1.1 .

2 Attempt any three questions. 18

- (a) Define activated complex. Explain collision theory of reaction rate.
- (b) Discuss mechanism of photochemical reaction using a suitable example.
- (c) Explain the kinetics and mechanism for parallel reaction giving suitable example.

- (d) Calculate rate constants for first order forward and reverse reversible reaction at 25 °C from following data. The initial and equilibrium concentrations of reactant A were 0.01 mol.lit<sup>-1</sup> and 0.0032mol.lit<sup>-1</sup> After 100 seconds of reaction, the concentration of A left was 0.0066 mol. lit<sup>-1</sup>.
3. Attempt any three questions. 18
- (a) Discuss any two methods for the determination of the partial molar property.
- (b) Derive relationship between chemical equilibrium constant and partition function.
- (c) Calculate the vibrational partition function of O<sub>2</sub> molecule in gases state at 1000 °C and 1 atm. pressure from the following data.  
Fundamental vibrational frequency for O<sub>2</sub>= 1580 cm<sup>-1</sup>,  
 $h = 6.625 \times 10^{-27}$  ergs,  $C = 2.998 \times 10^{10}$  cms<sup>-1</sup> and  
 $K = 1.38 \times 10^{-16}$  ergk<sup>-1</sup>.
- (d) Derive equation for the translational partition function for diatomic molecules.
- 4 Attempt any four questions. 16
- (a) Write a note on thermal transitions in polymer.
- (b) Define the terms: Intrinsic viscosity, Glass transition temperature, Copolymer, Tacticity.
- (c) Give an example of chain reaction and discuss the kinetics involved.
- (d) Give an account of rotational partition function.
- (e) Discuss excess function for nonideal binary liquid mixture.
- (f) At 25 °C the total volume V (in cm<sup>3</sup>) of a salt solution formed from 1 kg of water and n<sub>2</sub> mole of salt is given by
- $$V = 1000.21 + 16.46n_2 + 1.57n_2^{3/2} + 0.12n_2^2$$
- find the partial molar volume of salt of n<sub>2</sub> = 0.0 mol/1000g.