M. Sc. Previous Examination, 2005

CHEMISTRY

Paper III : Physical Chemistry

Time : Three Hours | Max. Marks : 100

Note : Attempt all questions from section A (Objective type) and section B (short answer type) and three questions from section C (Long/Essay/ type).

Section A 2x10=20

1. The Schrodinger wave equation for three dimenstion is .....
2. The order of reaction can not be :
   (a) Zero (b) Fractional (c) Negative (d) All are possible
3. The Laplacian operator symbol ∇^2 stands for .....
4. Corrosion can not be prevented by :
   (a) Galvanization (b) Anodic protection (c) Electroplating (d) Painting
5. The founder of polarography was :
   (a) Illkovic (b) Heyrovsky (c) Vant Hoff (d) Kelvin
6. The molecular weight of polymer is not determined by :
   (a) Osmometeric method (b) Viscosity method
   (c) Light scattering method (d) Surface tension method.
7. Ionic strength is given by equation :
   (a) $\mu = \frac{1}{2}\sum C_i^2 Z_i^2$ (b) $\mu = \sum C_i Z_i^2$ (c) $\mu = \frac{1}{2}\sum C_i Z_i^2$ (d) None of these
8. The term activity is used when the solution is of :
   (a) concentrated solution of an electrolyte (b) Dilute solution of an electrolyte
   (c) Both of these (d) Non electrolyte.
9. The Gibbs addsorption isotherm equation is :
   (a) $\Upsilon = -\frac{d\gamma}{dc}, \frac{c}{R_T}$ (b) $\Upsilon = -\frac{d\gamma}{dc}, \frac{c}{R_T^2}$ (c) $\Upsilon = +\frac{d\gamma}{dc}, \left(\frac{c}{R_T}\right)^2$ (d) $\Upsilon = +\frac{d\gamma}{dc}, \frac{c}{R_T}$
10. The Fermi-Dirac statistics distribution equation is .....

Section B 4x5=20

1. Write postulates of quantum mechanics.

   OR

   Explain addition of angular momenta spin.
2. Write a note on chemical potential.

   OR

   Derive Bose-Einstien statistics distribution law equation.
3. Write kinetics of unimolecular reactions.

   OR

   Write nuclear magnetic resonance method for fast reactions.
4. Write a note on surface films on liquids.

   OR

   Write the kinetics of polymerization.
5. Explain different theories of corrosion.

   OR

   Explain theory of double layer at semiconductor electrolyte solution interface.

Section C 20x3=60

1. Solve the Schrodinger equation for the harmonic oscillator for its energy levels.
2. Explain the term fugacity and give different methods for its determination.
3. (a) Explain the kinetics of some suitable fractional order of reaction.
   (b) Explain primary salt effect in detail.
4. What are the defects in Langmuir adsorption isotherm equation. Derive B.E.T. equation.
5. Explain the principle of polaropaphy and how the polarograms are recorded experimentally ? Give different applications of polarography.