M. Sc. Chemistry Sem. – IV Examination April-2016

Physical Chemistry: Paper-XV

(Selected Topics in Physical Chemistry) Subject Code: 3540

Time: 2 hours & 30 mins. **Total Marks: 70**

Q-1(a) Give an account of reactions mechanism of chain reaction between hydrogen and bromine molecules. 08

(b) State the characteristics of chain reaction. 06

OR

Q-1(a) Explain auto oxidation. Give an account of kinetic of hydrogen and oxygen molecules. 08

(b) Show that the decomposition of Ozone follows first order kinetics. 06

Q-2(a) Derive an expression for Fermi-Dirac distribution law. 10

(b) Calculate the rotational partition function of hydrogen gas at 0° C. 04
$I = 0.459 \times 10^{-40}$ gm cm^2, $\sigma = 2$

OR

Q-2(a) Device an expression for Bose-Einstein Distribution Law and hence Boltzmann Distribution Law. 10

(b) Calculate the translation partition function for 100 cm^3 of hydrogen gas at 25°C. 04

Q-3(a) Derive the general expression for E M F of reversible cells. 07

(b) The standard potential of the Ag, $Ag_2O_{(s)}$ OH^- electrode is -0.344 Volt at 25^0C. The heat of formation of silver oxide is -7.300 cal at 25^0C and ΔC_p is about 1.0 cal deg^{-1} $mole^{-1}$. Estimate the temperature at which silver oxide will dissociate freely in air. 07

OR

Q-3(a) Discuss the determination of dissociation constant by E M F method. 07

(b) The E.M.F. of the cell $Zn/ZnCl_2$ (1.0 m)/$AgCl_{(s)}$, Ag is 1.015 Volts at O°C and 1.005 Volts at 25^0 C. assuming the temperature co-efficient to be approximately constant in this vicinity calculate the heat change of the cell reaction at 25^0C. 07

Q-4(a) State different types of partition functions and factors affecting them. 08

(b) Define: Chain length, Degree of polymerization, Partition function Polycondensation, Thermodynamic probability and Ensemble. 06

OR

Q-4(a) Discuss the kinetics and mechanism of Ring Scission Polymerization. 08

(b) Explain the different between: 06

(i) Macro and Microstate

(ii) Irreversible and Reversible electrodes

Q-5 Write short notes on: (Any Three) 14

(i) Stepwise Polymerization

(ii) Ionization constant of water

(iii) Ring scission polymerization

(iv) Equilibrium constant of metathetic reactions

(v) Single electrode potential