Registration No. : | | | | | | | | | | |

*Total number of printed pages – 3*

**B. Tech**
**BS 1103**

# First Semester Back Examination – 2014

## CHEMISTRY – I

## BRANCH : AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, EC, EEE, EIE, ELECTRICAL, ENV, ETC, FASHION, IEE, IT, MANUFACT, MANUTECH, MECH, MINING, MM, MME, PLASTIC, TEXTILE

**QUESTION CODE : L 353**

**Full Marks – 70**

**Time : 3 Hours**



*Answer Question No. **1** which is compulsory and any **five** from the rest.*
*The figures in the right-hand margin indicate marks.*

1. Answer the following questions : 2×10

(a) From a reaction mixture when portion is removed for analysis the rate of reaction is not affected why ?

(b) How you will verify the reaction is first order or not ?

(c) When does cell formulation represent non spontaneous activity of galvanic cell ?

(d) For cell reaction $cu(s)+2Ag^{+}(aq) \rightarrow cu^{+2}(aq) + 2Ag(s)$ calculate equilibrium constant at 298, when $E^{\circ}_{CELL} = 0.46V$.

(e) In a body centred unit cell the body diagonal contained extra atom. Find the no. of atom present per unit cell.

(f) Explain why frenkel defects does not change density of solids.

(g) Show that $N_2$ molecule has greater bond dissociation energy than $N_2^{+}$.

(h) Compare $\sigma$ and $\Pi$ molecular orbital.

P.T.O.

(i) Explain why mixture of water and alcohol is a one phase system where as water and carbon tetra chloride is two phase system.

(j) State Krichoff equation. What is its significances ?

2. (a) The heat of formation of CH4, CO2 and H2O are, –75, – 390 and –286 kJ respectively. Calculate the heat of combustion of methane at ordinary temperature. 5

(b) Derive a second order reaction rate equation for the reaction 2A → PRODUCT. Explain the half life period depend upon the initial concentration of reactants. 5



3. (a) A galvanic cell is constructed by connecting $Cd^{+2}$ /Cd and $Cu^{+2}$/Cu half cell by a salt bridge. Represent the cell, and calculate the standard cell potential. Given that
$E^0$ for $Cd^{+2}$ /Cd= – 0.40V, and for $Cu^{+2}$/Cu=0.34V. Also write the half cell reaction. 5

(b) What do you mean by the metastable equilibrium ? Discuss the metastable equilibrium of water and sulphur system. 5

4. (a) For a certain 1st order reaction carried out at 298. The use of a catalyst increase the rate by ten times. Calculate the decrease in activation energy caused by catalyst. 5

(b) What is the basis of Heisenberg's uncertainty principle ? State Heisenberg's principle and discuss it relevance for microscopic particle. 5

5. (a) A solid A+ and B– has NaCl type closed packed structure. if anion has radius of 250 pm, what should be ideal radius for cation ? Can a cation c+ having radius 180 pm be slipped in to tetrahedral side of crystal A+, B– . Give the reason for you answer. 5

(b) Prove that $Cp - Cv = [P+\{\partial U/\partial V\}_T][\partial V/\partial T]p$ 5

6. (a) Give a comparison between collision theory and Transition theory of eaction rate. 5

(b) What do you mean by the Lattice energy ? How do you calculate the lattice of Nacl ? Explain. 5

7. (a) The rate constant of a reaction is found to be tripled when the temperature increased from 25°C to 60°C. Calculate the activation energy. 5

(b) How pH is measured by a glass electrode ? 5

8. Write short notes on any **two** of the following : 5×2

(a) Liquid junction potential

(b) Eutectic system

(c) Metallic bonding

(d) Heterogeneous catalysis.