Registration No. :

Total number of printed pages – 2

B. Tech

BSCC 2101

First Year Special Examination – 2014

CHEMISTRY – I

BRANCH(S) : AEIE, CSE, EC, ELECTRICAL, IT, MECH

QUESTION CODE : G 415

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) Why fusion curve of ice has negative slope and transition curve of sulphur has positive slope ?

   (b) Give the unit of rate constant of a second order reaction with an example.

   (c) What is the significance of writing + or – (minus) sign before the rate of reaction ?

   (d) What are the Miller indices, if the plane intersects the crystal lattice at 2a, b, 2c ?

   (e) A second order reaction, when two reactants are same, is 30% completed in 500 seconds. How long will it take to go to 90% completion ?

   (f) What do you mean by the triple point and eutectic point ?

   (g) O_2^- is paramagnetic but O_2^{-2} is diamagnetic. Explain.

   (h) What is the relation between the rate constant and temperature of a reaction ?

   (i) What is Degree of Freedom ? What is the value above and below critical point ?

   (j) Write down conditions for quantization of wave function.

P.T.O.

2. (a) What do you mean by the Triple point, Critical point and Boiling point of a substance ? Explain these points with help of phase diagram. 5

(b) Derive an expression for second order reaction when two reactants are different. 5

3. (a) Calculate the equilibrium constant of cell reaction

$$2Ag^+ + Zn \leftrightarrow 2Ag + Zn^{+2}$$

occurring in the Zinc – Sliver cell at 25^0C when concentration of Zn^{+2} is 0.10 M and Ag^+ is 10 M. The EMF of the cell is found to be 1.62 Volts. 5

(b) How can you find pH of solution using glass electrode ? Discuss its advantages and disadvantages. 5

4. State and explain Le-Chatelier's principle with an example. 10

5. (a) Calculate the degree of hydrolysis of decimolar solutions of ammonium acetate at 25^0C. Dissociation constants of acetic acid and ammonium hydroxide are 1.75×10^{-5} and 1.81×10^{-5} mol dm^{-3} respectively at $25°C$. (K_w at $25°C = 1.008 \times 10^{-4}$). 5

(b) What do you mean by homogeneous catalysis ? Discuss its theory. 5

6. (a) Find out pH of 10^{-6} M HCl solution after diluting it to 100 times. 4

(b) What are defects in crystals ? Discuss different types of defects. 6

7. (a) Write down the time independent – one-dimensional Schrödinger wave equation for a particle of mass m With a potential energy V. Discuss the physical significance of ψ and ψ^2. 5

(b) Explain why it is permissible to omit the concentration of pure solid and liquids in calculating K_c. 5

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

(a) Common ion effect

(b) Buffer solution with examples

(c) Hydrogen electrode

(d) L.C.A.O.