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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)
- Why fusion curve of ice has negative slope and transition curve of sulphur has positive slope ?
  - Give the unit of rate constant of a second order reaction with an example.
  - What is the significance of writing + or – (minus) sign before the rate of reaction ?
  - What are the Miller indices, if the plane intersects the crystal lattice at  $2a$ ,  $b$ ,  $2c$  ?
  - 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 ?
  - What do you mean by the triple point and eutectic point ?
  - $O_2^-$  is paramagnetic but  $O_2^{-2}$  is diamagnetic. Explain.
  - What is the relation between the rate constant and temperature of a reaction ?
  - What is Degree of Freedom ? What is the value above and below critical point ?
  - 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  

$$2\text{Ag}^+ + \text{Zn} \leftrightarrow 2\text{Ag} + \text{Zn}^{+2}$$
 occurring in the Zinc – Silver cell at 25°C. when concentration of  $\text{Zn}^{+2}$  is 0.10 M and  $\text{Ag}^+$  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°C. Dissociation constants of acetic acid and ammonium hydroxide are  $1.75 \times 10^{-5}$  and  $1.81 \times 10^{-5} \text{ mol dm}^{-3}$  respectively at 25°C. ( $K_w$  at 25°C =  $1.008 \times 10^{-14}$ ). 5
- (b) What do you mean by homogeneous catalysis ? Discuss its theory. 5
6. (a) Find out pH of  $10^{-6} \text{ M}$  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  $\psi$  and  $\psi^2$ . 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.

