

Registration No. :

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Total number of printed pages – 3

B. Tech
BS 1103

Second Semester Regular / Back Examination – 2015

CHEMISTRY - I

BRANCH (S) : AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, EC, EEE, EIE, ELECTRICAL, ETC, IT, MANUTECH, MECH, MINERAL, MINING, MME, TEXTILE

QUESTION CODE : J 293

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) What do you mean by the Enantiotropy ? Explain with example.
 - (b) Why transition curve of Rhombic sulphur has positive slope ?
 - (c) What are the significance of De brogile equation ?
 - (d) What do you mean by Non primitive unit cell ? Define various type of Non primitive unit cell.
 - (e) Write down Arrhenius equation in form of equation of straight line. What will be the slope of plot using this equation ?
 - (f) A reaction involving two reactant A and B is a second order reaction. Write The different rate laws which might apply to this reaction.
 - (g) When two gas at same temperature and pressure brought in contact ? They diffuse spontaneously each other. What is the reason for this ? Explain.
 - (h) For one mole of an ideal Gas $T = f(P, V)$ show that ∂T is Perfects Differential.
 - (i) Calculate the miller indices of crystal plane which cuts through the crystal Axes (2a, 3b, 3c).
 - (j) What is Degree of Freedom ? What is value above and Below critical point.

P.T.O.

2. (a) What do you mean by the Eutectic point and Triple point ? Explain with phase Diagram. 4
- (b) On the top of a certain mountain the atmosphere pressure is 530 mm Hg. and pure water boils at 360 K. A climber find that it takes 3×10^2 min to boil an egg as Against 3 mts at 370 K
- (i) What is the relation between rate of boiling the Egg and time ?
- (ii) What is the ration of rate constant K_{370}/K_{360} ?
- (iii) What is the activation energy for the reaction that occurs when egg is boiled ? Given that Pre exponential factor A remains constant. 6
3. (a) Calculate EMF of cell
 $\text{Mg(s)}/\text{Mg}^{+2}(0.1 \text{ m})//\text{Ag}^{+}(1 \times 10^{-4})/\text{Ag}$
 $E^0_{(\text{Ag}^{+}/\text{Ag})} = 0.8 \text{ V}, E^0_{(\text{Mg}^{+2}/\text{Mg})} = -2.37 \text{ V}$
 What will be the effect of Emf ? If concentration of Ag^{+} is increased to $(1 \times 10^{-3} \text{ m})$. 5
- (b) If $\partial G = -S \partial T + V \partial P$, then prove that $\{\partial S / \partial P\}_T = -\{\partial V / \partial T\}_P$. 5
4. (a) State the Hess 'law of constant Heat of summation. What is its application ? 5
- (b) What do you mean by the Eutectic and Eutectoid reaction ? Explain with example. 5
5. (a) What do you mean by Eigen value and Eigen function ? 3
- (b) What do you mean by Bond Energy ? Write one application. 4
- (c) Calculate the EMF of the cell at 298 K
 $\text{Cr}/\text{Cr}^{+3}(0.1 \text{ M})//\text{Fe}^{+2}(0.1 \text{ M})/\text{Fe(s)}$
 $E^0_{(\text{Cr}^{+3}/\text{Cu})} = -0.75 \text{ V}, E^0_{(\text{Fe}^{+2}/\text{Fe})} = -0.45 \text{ V}$. 3
6. (a) At 25°C $[\partial E^0 / \partial T]_P = -2.25 \times 10^{-3} \text{ VK}^{-1}$
 $E^0 = 1.46 \text{ V}$ for cell $\text{Pt}/\text{H}_2(\text{g})/\text{HCl}(\text{aq})/\text{Cl}_2(\text{g})/\text{pt}$
 Calculate the Enthalpy, entropy change for cell reaction. 5
- (b) What do you mean by close packing of crystals ? Discuss HCP and BCC Close packing. 5



7. (a) Draw the molecular orbital configuration of O_2 , O_2^- , O_2^+ . Compare between them in reference to magnetic behavior and bond length. 5
- (b) What do you mean by Fuel cell ? Write down the cell reaction of H_2-O_2 fuel cell. 5
8. Write short notes on any **two** : 5×2
- (a) Metallic Bonding
 - (b) Glass electrode
 - (c) Collision theory of reaction Rate
 - (d) Enzyme catalysis.

