

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

END SEMESTER EXAMINATION-2015

B.Tech (Civil) II<sup>nd</sup> Semester

COURSE CODE: 10B11CL212

MAX. MARKS: 45

COURSE NAME: CHEMISTRY

COURSE CREDITS: 4

MAX. TIME: 3 HRS

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

Section A

(Marks: 9[1 each])

- Q1(a). Why cullets are added during manufacturing of glass?  
(b). Explain correct Air-fuel ratio.  
(c). Give two applications of technical ceramics.  
(d). Name any two common mineral Zeolites along with their uses.  
(e). Classify Isotactic and Atactic Polymers.  
(f). How is radius ratio in ionic solids related to coordination number?  
(g). Why nickel plated iron articles should be free from pores?  
(h). What are AFC's?  
(i). State Henry's law.

Section B

(Marks: 13.5)

- Q1(a). In Potassium permanganate titrations the color changes at end point depends upon the pH of solution. Give reasons. (2)  
(b). Elaborate Refractories. How important are the refractoriness, R.U.L and thermal spalling when refractories are put to industrial use? (3)  
Q2. Describe the mechanism of differential aeration attack caused by presence of water droplet with the help of diagram. (3)  
Q3(a). Elucidate the formulation and failure of paint films. (2.5)  
(b). Elaborate the main characteristics and relevant heat treatment processes for the development of steel articles. (3)

Section C

(Marks: 22.5)

- Q1(a). In a polymer, there are 100 molecules of molecular mass 100, 200 molecules of molecular mass 1000 and 300 molecules of molecular mass 10000. Find  $M_n$ ,  $M_w$  and PDI. (3)  
(b). 42 gm of propene was polymerized by radical polymerization process and DP was found to be 1000. Calculate the number of molecules of Polypropylene produced. (2)  
Q2(a). Elaborate Vat Electroplating process for metals. (4)  
(b). A polymer sample consists of 10% by weight of macromolecules of molecular weight 10,000 and 90% by weight of macromolecules of molecular weight 100,000. Calculate  $M_n$  and  $M_w$ . (3)

- Q3(a). At 27°C in the presence of a catalyst, the activation energy of a reaction is lowered by 2 kcal. Calculate by how much the rate of reaction will increase? Given  $R = 1.987 \times 10^{-3} \text{ kcal K}^{-1} \text{ mol}^{-1}$  (3)
- (b). The EMF of a cell corresponding to the reaction  $\text{Zn(s)} + 2\text{H}^+(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{0.1M}) + \text{H}_2(\text{g, 1 atm})$  is 0.28V at 25°C. Write the half cell reactions and calculate the pH of the solution at the hydrogen electrode. Given  $E^\circ_{\text{Zn}} = -0.76 \text{ V}$  and  $E^\circ_{\text{H}_2} = 0$  (3)
- Q4(a). Calculate the amount of  $\text{NH}_3$  and  $\text{NH}_4\text{Cl}$  required to prepare a buffer of pH 9, when the total concentration of buffering reagents is  $0.6 \text{ mol L}^{-1}$  ( $\text{pK}_b$  for  $\text{NH}_3 = 4.7$ ) (2)
- (b). Calculate the molality of a sulphuric acid solution in which the mole fraction of water is 0.85. (2.5)

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