

BACHELOR OF CIVIL ENGINEERING EXAMINATION, 2017(1st Year, 2nd Semester)**CHEMISTRY FOR CIVIL ENGINEERING**

Time: Three Hours

Full Marks: 100

Answer any five questions

1. (a) Write down the approximate composition of Cement. 2
 (b) Discuss the setting process of Portland cement with proper reactions. 6
 (c) Write down the flow sheet diagram for the analysis of cement sample with proper reactions and indicator used for the estimations. 10
 (d) What is Class C and Class F type fly ash? 2
2. (a) Define glass physically and chemically. Mention the characteristics of glass. Write down the raw materials from which glass is manufactured. Write down two coloring agents of glass. 2+2+3+3+2=12
 (b) What is glass wool? Mention its properties and applications. 2+3+3=8
3. (a) Write down the chemical reactions occurring in the furnace during the manufacture of glass. 5
 (b) Distinguish between fat lime and hydraulic lime. 5
 (c) What is porcelain? Mention the important requirements of porcelain. 2+3=5
 (d) What is tar? Mention some of its uses. 2+3=5
4. (a) What is asphalt? Write its various types of uses. 2+3=5
 (b) Write down the chemical formulae of the following:
 (i) Quick lime (ii) Slaked lime (iii) Alumina (iv) Magnesia (v) Potash feldspar
 (vi) Soda feldspar 3
 (c) Write a short note on the industrial manufacture of porcelain mentioning the raw materials involved in this manufacture. 5
 (d) Write a concise note on setting and hardening of limes. 4
 (e) What is glazing? 3

5. (a) Draw a potential versus pH diagram for H^+/H_2 system ($E^0 = 0$ V) and O_2/H_2O system ($E^0 = 1.23$ V). Explain the diagram 3+3
- (b) Show that the formal potential of MnO_4^-/Mn^{2+} system ($E^0 = 1.51$ V) decreases with increase in pH and hence show that MnO_4^- can oxidise Cl^- only at low pH. ($E^0 (Cl_2/Cl^-) = 1.36$ V) 5
- (c) Calculate the statistically expected ratio of stepwise stability constants for $[Mg(H_2O)_6]^{2+}$ 6
- (d) Draw the structure of Mg-EDTA complex. 3
6. (a) Calculate the pH at which $Fe(OH)_2$ starts to precipitate from the solution of 0.01(N) $FeCl_2$ solution. Also calculate the pH at which the precipitation is 99.9% complete. Given the K_{sp} of $Fe(OH)_2$ is 10^{-18} . 5
- (b) Calculate the formal potential of $Cu(II)/Cu(I)$ system ($E^0 = 0.15$ V) in presence of excess iodide. Given $K_{sp}(CuI) = 10^{-12}$. 5
- (c) Define lubrication. Discuss any one mechanism of lubrication. 5
- (d) Discuss Cloud and Pour points. 5
7. (a) Discuss film growth laws.
- (b) Discuss Pilling-bedworth rule.
- (c) Write short note (any two).
- (i) Water line attack (ii) Crevice corrosion (iii) Drop corrosion. 5+5+5+5