

Code No: 111AE**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech I Year Examinations, November/December - 2015****ENGINEERING CHEMISTRY****(Common to all Branches)****Time: 3 hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART- A**(25 Marks)**

- 1.a) What is the effect of dilution on the specific conductance? [2]
- b) Write the preparative method for polylactic acid. [3]
- c) Explain how the relative areas of anode and cathode influence the rate of corrosion. [2]
- d) Give preparation and two uses of Teflon. [3]
- e) A water sample contains 102mg of CaSO_4 in 1 litre. Calculate its hardness in terms of equivalent of CaCO_3 . [2]
- f) What is LPG? Give its composition. [3]
- g) Define Gross and Net calorific values. [2]
- h) What is condensed phase rule? Give an expression for this. [3]
- i) What is a phase diagram? What are its components? Give an example. [2]
- j) What do you understand by disinfection of water by Ozonisation. [3]

PART-B**(50 Marks)**

- 2.a) Explain the mechanism of Electrochemical corrosion with suitable example.
- b) What is Cathodic protection? What are the types of cathodic protection? Explain them. [5+5]

OR

- 3.a) What are Conductometric titrations. Discuss them in detail.
- b) The resistance of a cell filled with 0.02M KCl solution at 25°C is 150 ohms. At the same temperature the specific conductance of 0.02 M KCl is $0.0027 \text{ ohm}^{-1}\text{cm}^{-1}$. After washing and cleaning the cell, it is filled with 0.01M ZnSO_4 solution and the observed resistance is 45 ohms. Calculate the specific and equivalent conductances of ZnSO_4 . [5+5]
- 4.a) What is Polymerization? Discuss the mechanism of free radical addition polymerization with suitable example.
- b) Define Biodegradable polymers. Explain the preparation of polylactic acid and polyglycolic acid and give their applications. [5+5]

OR

- 5.a) Give the structure of natural rubber. What are the disadvantages with it, explain how they can be overcome by vulcanization.
b) Differentiate between thermoplastics and thermosets. Discuss the preparation and applications of Teflon and Bakelite. [5+5]

- 6.a) What is hardness of water? What are its types? How would you determine the hardness of a water sample by complexometric method using EDTA?
b) A water sample has given the following analysis:
 $\text{Ca}(\text{HCO}_3)_2 = 40 \text{ mg/lit}$, $\text{Mg}(\text{HCO}_3)_2 = 25 \text{ mg/lit}$, $\text{MgSO}_4 = 45 \text{ mg/lit}$,
 $\text{CaSO}_4 = 34 \text{ mg/lit}$, $\text{CaCl}_2 = 75 \text{ mg/lit}$ and $\text{MgCl}_2 = 100 \text{ mg/lit}$.
Calculate the temporary, permanent and total hardness of water sample. [5+5]

OR

- 7.a) Discuss how hard water can be softened by the zeolite process.
b) 50,000 litres of a hard water sample were softened by passing through a zeolite softener. This softener required 200 litres of NaCl solution having 75 gm/lit for regeneration. Calculate the hardness of water sample. [5+5]

- 8.a) Define octane and cetane numbers. Describe their significance.
b) Discuss the ultimate analysis of coal and give its importance. [5+5]

OR

- 9.a) What is calorific value? Define HCV, LCV. How would you determine the calorific value of a fuel using Junker's calorimeter?
b) A sample of coal was found to contain the following composition
C=82%, H=4.5%, S=1%. O=12% and remaining is ash. Calculate the minimum amount of air required for the complete combustion of 1 Kg of coal. [5+5]

- 10.a) What is Gibb's phase rule? Define and explain various terms involved in the phase rule, with suitable examples.
b) Discuss the applications of phase rule to the water system. [5+5]

OR

- 11.a) Derive Freundlich adsorption isotherm.
b) Differentiate between lyophilic and lyophobic solutions. Write a short note on
i) Brownian movement ii) Tyndall effect. [5+5]

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