

Code No: 51005

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech I Year Examinations, December-2014/January-2015

ENGINEERING CHEMISTRY

(Common to all Branches)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Define specific conductance and equivalent conductance of an electrolyte solution and mention their units.
- b) State and explain Kohlrausch's law. How is it used for determining the equivalent conductance at infinite dilution of weak electrolytes?
- c) What is the emf of the following cell at 25^o C.

$$\text{Zn/Zn}^{2+} (0.001\text{M}) // \text{Fe}^{2+} (0.005\text{M}) / \text{Fe}$$

$$[E^{\circ}_{\text{Zn}^{2+}/\text{Zn}} = -0.76\text{V} \text{ and } E^{\circ}_{\text{Fe}^{2+}/\text{Fe}} = -0.44\text{V}]$$
- 2.a) Explain the reactions occur at saturated calomel electrode when it acts as anode.
- b) Define primary and secondary batteries. Give examples to each.
- c) What is fuel cell? Explain H₂-O₂ fuel cell in detail and mention its applications.
- 3.a) What are the types of corrosion? Explain the mechanism involved in evolution of hydrogen type corrosion.
- b) Write notes on the following factors that influence the rate of corrosion.
 - i) Nature of oxide film
 - ii) Galvanic series.
- c) Describe electroplating process.
- 4.a) What is meant by polymer? Explain free radical mechanism of polymerization.
- b) What are the drawbacks of raw rubber?
- c) Write the preparation and uses of
 - i) Butyl rubber
 - ii) Polyester.
- 5.a) What are the problems of using hard water in boilers? Explain boiler corrosion.
- b) 50 ml of standard hard water containing 1mg of pure CaCO₃ per ml consumed 20 ml of EDTA. 50 ml of hard water consumed 25 ml of same EDTA solution using EBT indicator. Calculate the total hardness of water sample in ppm.
- c) Write notes on reverse osmosis method.
- 6.a) Define H.C.V and L.C.V of a fuel. Explain the determination of calorific value of the fuel by Junker's gas calorimeter.
- b) What is cracking process? Mention the advantages of catalytic cracking process?
- c) Calculate the minimum weight and volume (at NTP) of air required for complete combustion of 1 kg of coal having the following percentage composition by weight.
 C=90; H=3.5; O=3.0; S=0.5; N=0.5 and ash=2.5.