Hall Ticket No | | | | | | | | | | | Question Paper Code: AHS005

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech I Semester End Examinations(Supplementary) - January, 2019

Regulation: IARE – R16

Engineering Chemistry

Time: 3 Hours **(Common to All Branches)** **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) What product forms from the lead components of a lead storage battery? Why does mechanical shock (bumps) ultimately degrade the performance of the lead storage battery? **[7M]**

   (b) Electrode potentials are specified as potentials relative to a standard hydrogen reference electrode. Why is the electrode potential specified in this manner rather than absolute values being given? Also explain the measurement of Electrode potential values of any two electrodes with neat diagrams and necessary cell notations. **[7M]**

2. (a) Based on the chemistry that takes place, Explain why a Dry cell is called Primary and dry. **[7M]**

   (b) The equivalent conductance of 0.005N NaOH solution is 240 mho cm^2 $equiv^{-1}$. What is specific conductance and electrical resistance, if the electrodes are 1 cm apart and each have a surface area of 1 cm^2? **[7M]**

UNIT – II

3. (a) Identify and explain in detail mechanism of the possible type of corrosion that Iron metal will undergo in the marine environment containing NaCl with neat diagram. **[7M]**

   (b) A marine CHEMIST drops and breaks a mercury thermometer in the bottom of an aluminium dinghy. The nature of the spillage made it extremely difficult to retrieve all the droplets of Hg metal from the bottom of the boat. Quite soon after this accident, the boat developed small holes in its hull. Why did the boat corrode? Give two reasons. **[7M]**

4. (a) Explain the type of corrosion occurring in the following cases **[7M]**

   (i) Bolt and nut made from different metals are in contact with each other.

   (ii) Deposition of small particles of dust on iron surface.

   (b) A student, in replying to an examination question, writes: 'Corrosion of metal is due to electrical currents of electrochemical origin, Stop current stop corrosion. Comment on the correctness or otherwise of this statement on the basis of your knowledge of electrochemistry. Use Chemical reactions and neat diagrams where ever is necessary. **[7M]**

UNIT – III

5. (a) Discuss various steps involved in the treatment of potable water? **[7M]**

   (b) Two samples of canal water are collected at a distance of 1.5 kms. 100 ml of the water sample collected at point one requires 24 ml of EDTA solution on titration. 100 ml of the water sample collected at point 2 required 20 ml of EDTA solution on titration. 100 ml of SHW (0.28 gms of $CaCO_3$ per liter) requires 22 ml of EDTA solution on titration. Discuss the result and conclusion. **[7M]**

6. (a) DISCUSS ion exchange process of water softening with neat DIAGRAM. Give the chemical reactions where ever is necessary? **[7M]**

   (b) "Every demineralised water is softened water and every softened water is not demineralised water", Justify **[7M]**

UNIT – IV

7. (a) Discuss the preparation, properties of polymers used in fabricating switches and Non lubricating bearings? **[7M]**

   (b) A number of compounds are used in cement and reactions among them occur when water is added. In one, CaO reacts with Al_2O_3 and water to form $Ca_3Al_2(OH)_{12}$. Write a balanced chemical equation for this process. **[7M]**

8. (a) Discuss the composition, setting and hardening reactions of Portland cement? **[7M]**

   (b) Mention preparation method and uses of following polymers: **[7M]**

   i. PVC

   ii. Nylon 6:6

UNIT – V

9. (a) Explain the terms 'Proximate analysis' and 'Ultimate analysis', highlighting the relative merits and usefulness of each type of analysis. **[7M]**

   (b) A sample of coal contains the following composition Carbon=84%, Hydrogen=12%, Oxygen=2%, Sulphur =1% and the remainder being ash. Calculate the gross and net calorific values of the fuel. **[7M]**

10. (a) Outline the problems associated with the use of gases as fuels and methods of preventing the same. **[7M]**

    (b) 100 Kg of solid fuel has the following percentage composition by weight: C = 84%, H_2 = 12%, S = 1.5% and O_2 = 2.5% and it is burnt with 40% excess of theoretically required amount of air. Calculate the amount of air required for combustion of 100kg of fuel. **[7M]**