Hall Ticket No | | | | | | | | | | | Question Paper Code: AHSB03

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech I Semester End Examinations(Regular) - December, 2019

Regulation: IARE – R18

ENGINEERING CHEMISTRY

Time: 3 Hours **(Common to CSE | IT | EEE)** **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) Define standard electrode potential and galvanic series. Explain about Galvanic cell. **[7M]**
   (b) What is secondary battery? Describe the construction and working of Lithium Ion battery with reactions occurring during charging and discharging. **[7M]**

2. (a) What is oxidation corrosion and how does it takes place? Describe the mechanism of oxidation corrosion? **[7M]**
   (b) "Galvanized container is not used for storage of food products, but tin coated container is used". Comment on the statement. **[7M]**

UNIT – II

3. (a) Describe briefly the various methods of internal conditioning of boiler feed water. **[7M]**
   (b) Municipal water sample has been collected for estimation of hardness and sample is titrated with 0.098M EDTA solution. In this process 20 ml of sample, consumed 10 ml of EDTA and the same volume of boiled water consumed 5 ml of EDTA. Find out the total, temporary and permanent hardness of water. **[7M]**

4. (a) Write a brief account on
   i) Temporary hardness
   ii) Permanent hardness **[7M]**
   (b) One liter of water from an underground reservoir in Tirupathi town in Andhra Pradesh showed the following analysis for its contents: $Mg(HCO_3)_2$=42mg; $Ca(HCO_3)_2$=146mg; $CaCl_2$=71mg; $MgSO_4$ = 48 mg; Calculate temporary, permanent and total hardness of this sample of 10,000 liter of water. **[7M]**

UNIT – III

5. (a) Define the following terms
   i) Bond order
   ii) Bonding molecule orbital
   iii) Anti-bonding molecule orbital **[7M]**
   (b) Draw the molecular orbital energy level diagram of O_2 and N_2 molecules and calculate its bond order? **[7M]**

6. (a) Write short notes on the following
   i) p-type semiconductors
   ii) n-type semiconductors **[7M]**

   (b) Write the salient features of crystal field theory and describe the crystal field splitting of octahedral complex. **[7M]**

UNIT – IV

7. (a) Write conformation analysis of n-Butane. What is Saytzeffs rule and explain with suitable examples. **[7M]**

   (b) What are Grignard reagents? Explain the Grignard additions on carbonyl compounds with suitable examples. **[7M]**

8. (a) What is nucleophilic substitution? Write the process of synthesis and applications of paracetamol. **[7M]**

   (b) How do you distinguish the following
   i) Chiral carbon from achiral carbon
   ii) Enantiomers from diastereomers **[7M]**

UNIT – V

9. (a) Define octane number. Explain the composition, properties and applications of LPG. **[7M]**

   (b) Write a short note on
   i) Cetane number
   ii) Applications of CNG **[7M]**

10. (a) Define the terms calorific value, high calorific value (HCV) and low calorific value(LCV) and explain the relation between HCV and LCV . **[7M]**

    (b) Calculate the gross and net calorific values of a coal sample having the following composition Carbon=80%,Hydrogen=7%,Oxygen=3%, Sulphur=3.5%, Nitrogen=2% and Ash=5%. **[7M]**