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15CHE12/22

**First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Engineering Chemistry**

Time: 3 hrs.

Max. Marks: 80

**Note: Answer FIVE full questions, choosing one full question from each module.**

**Module-1**

- 1 a. Describe the construction and working of Li-MnO<sub>2</sub> battery. (05 Marks)
- b. Define battery. Explain the following battery characteristics:
  - (i) Electricity storage density.
  - (ii) Energy efficiency.
  - (iii) Cycle life.
  - (iv) Shelf life. (05 Marks)
- c. Define reference electrode. Explain the construction and working of Calomel electrode. (06 Marks)

**OR**

- 2 a. A concentration cell was constructed by immersing two silver electrodes in 0.02 M and 2 M AgNO<sub>3</sub> solution. Write the cell representation, cell reactions and calculate the EMF of the cell at 25°C. (05 Marks)
- b. Derive Nernst equation for single electrode potential. (05 Marks)
- c. Explain the construction and working of methanol oxygen fuel cell. Mention its application. (06 Marks)

**Module-2**

- 4 a. What is cathodic protection? Explain how a metal article is protected by sacrificial anodic method. (05 Marks)
- b. Explain the following factors affecting the rate of corrosion:
  - (i) Nature of the metal.
  - (ii) Ratio of anodic to cathodic areas.
  - (iii) pH. (05 Marks)
- c. Explain electroless plating of copper with relevant reaction. (06 Marks)

**OR**

- 4 a. What is metal finishing? Give the technological importance of metal finishing. (05 Marks)
- b. Explain the influence of the following factors on the nature of electrodeposition:
  - (i) pH.
  - (ii) Temperature.
  - (iii) Concentration of the metal ion. (05 Marks)
- c. Explain stress and differential metal corrosion with example. (06 Marks)

**Module-3**

- 5 a. Define cracking. Describe fluidized bed catalytic cracking. (05 Marks)
- b. What is biodiesel? Explain the synthesis and advantages of biodiesel. (05 Marks)
- c. Explain the production of solar grade silicon by union-carbide process. (06 Marks)

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OR

- 6 a. Define photo voltaic cell. Explain the construction and working of photo voltaic cell. (06 Marks)
- b. Explain the purification of silicon by zone refining. (04 Marks)
- c. A 0.6 g of coal sample (carbon 90%, H<sub>2</sub> 3% and ash 7%) was subjected to combustion in a bomb calorimeter. Mass of water taken in the calorimeter was 2000 g and the water equivalent of calorimeter was 400 g. The rise in temperature was 3°C. Calculate the gross and net calorific value of the sample. Given, specific heat of water is 4.187 KJ/kg/°C and latent heat of steam is 2454 KJ/kg. (06 Marks)

#### Module-4

- 7 a. Explain the radical mechanism for addition polymerization by taking vinyl chloride as an example. (06 Marks)
- b. Explain the synthesis, properties and applications of epoxy resin. (04 Marks)
- c. What is glass transition temperature? Explain the following factors affecting glass transition temperature.  
 (i) Chain flexibility and  
 (ii) Intermolecular forces. (06 Marks)

OR

- 8 a. Explain structure — property relationship of polymeris vihtliiPaptt ,  
 (i) Crystallinity (ii) Tensile strength (05 Marks)
- b. What is polymerization? Explain addition and condensation polymerization with example. (05 Marks)
- c. What are polymer %gip ite? Explain the synthesis, properties and application of Kevlar fibre. (06 Marks)

#### Module-5

- 9 a. Write a 411111w- llerenes. Mention its application. (05 Marks)
- b. Discuss-t synthesis of nanomaterials by gas condensation method and chemical vapour condensation processes. (05 Marks)
- c. Discuss the experimental determination of Dissolved Oxygen (DO) of waste water. Mention the reactions involved in it. (06 Marks)

OR

- 10 a. What is desalination? Discuss the desalination gtrf sea water by ion exchange process. (05 Marks)
- b. What is boiler feed water? Explain the scaleind sludge formation in boilers. (05 Marks)
- c. Explain any three size dependent properties of nanomaterials. (06 Marks)