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17CHE12

First Semester B.E. Degree Examination, Dec.2017/Jan.2018 Engineering Chemistry

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. What are reference electrodes? Describe the construction and working of Caloniel electrode, mention the uses. (07 Marks)
 - b. Define Battery. Explain construction, working and uses of Ni-metal Hydride battery.
 - (07 Marks) c. What are fuel cells? Explain the construction and work ing of Methanol oxygen cell. (06 Marks)

OR

- 2 a. Define single Electrode Potential? Derive Nernst equation for single electrode. (07 Marks)
 b. What are concentration cells? The cell potential of Ag concentration cell,
 - $\frac{Ag_{(s)}}{AgNO_3}$ (0.001M)(AgNO_3 (XM)/ Ag_{(s)} is 0.0659 V at 25°C. Write the cell reactions and

calculate the value of X.

c. Write a note on: (i) Capacity (ii) Cycle life (iii) Voltage (06 Marks)

Module-2

3 a. Define corrosion. Explain electrochemical theory of corrosion by taking Iron as an example.

b. What is Anodizing? Explain anodizing of aluminium, mention uses.
 c. Define Electra less plating. What are the differences between ciectro plating and electroless plating?
 (07 Marks)
 (08 Marks)

OR

- 4 a. What is differential aeration corrosion? Explain pitting corrosion with anode and cathode reactions. (07 Marks)
 - b. Define metal finishing? Explain electroplating of Nickel by Watt's bath, mention the uses. (07 Marks)
 - c. What is cathodic protection? Explain the sacrificial anode method and impressed current method. (06 Marks)

Module-3

- 5 a. Define GCV and NCV? How calorific value of a solid/liquid fuel is determined using bomb colorimeter. (07 Marks)
 - b. Define octane and cetanc number? What is the objective of reforming of petrol and discuss the various methods of reforming. (07 Marks)
 - c. What are solar cells? Describe the method of purification of silicon by zone refining.

(06 Marks)

(07 Marks)



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(06 Marks)

OR

- 6 a. A coal sample containing 92% C, 7% I+ and 3% Ash is subjected to combustion in a bomb calorimeter. Calculate the Gross and Net calorific values. Given that mass of coal sample is 0.85x IV" kg, mass of water in copper calorimeter is 2 kg, water equivalent of calorimeter is 0.75 kg, rise in temperature of water is 2.5°C, latent heat of steam is 2454 ki/kg and specific heat of water is 4.187 k.1/kg/C. (07 Marks) (07 Marks)
 - b. Describe the:production of solar grade Si by union carbide process.
 - c. Explain the construction and working of a PV cell.

Module-4

- 7 a. What are polymers? Illustrate the mechanism of addition polymerization by taking vinyl chloride as an example. (07 Marks)
 - b. Describe the manufacture of, (I) PMM A (ii) Kevlar. Mention the uses. (07 Marks)
 - c. Define addition and condensation polymerization process with one example each. (06 Marks)

OR

8 a. Define Glass Transition Temperature. Explain any three factors affecting Tg. (07 Marks)

- b. What are Elastomers? Give the synthesis and applications of, (i) Silicone rubber (ii) Epoxy resin. (07 Marks)
- c. A polymer sample containing 50, 100 and 150 molecule h I i tolar mass 2000 g/rnol, 2500 g/mol and 3000 g/mol respectively. Calculate the nu b average and weight average molecular mass of polymer. (06 Marks)

Module

- 9 a. What is Boiler Feed Water? Explain the differences between scale and sludge formation in boiler. (07 Marks)
 - What is desalination? Explain the desalination of sea water by electrodialysis. (07 Marks)
 - What are nano materials? Explain the synthesis of nano material by Sol.gel method. c.

(06 Marks)

(06 Marks)

OR

- a. Define COD and BOD. In COD test 25.5 cm³ and 12.5 cm' of 0.05 N FAS solution are 10 required for blank and sample titration respectively. The volume of the test sample used is 26 cm³. Calculate the COD of the sample solution. (08 Marks)
 - b. Describe the synthesis of nano materials by chemical vapor condensation process. (06 Marks)
 - c. Write a note on CNT and Dendrimers.