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14CHE12/22

First/Second Semester B.E. Degree Examination, June/July 2015
Engineering Chemistry

Time: 3 hrs.

Max. Marks:46)

 Note: Answer FIVE questions, selecting
ONE full question from each part.

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PART—A

- 1 a. Explain the construction and working of glass electrode. (05 Marks)
- b. Give the construction of calomel electrode. Justify that it is a reversible electrode. (05 Marks)
- c. Discuss the construction and working of Li — MnO₂ battery. G.t." (05 Marks)
- d. What are fuel cells? How is it different from galvanic cell? Aletibn any two advantages of fuel cell. (05 Marks)

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- Define reference electrode. Explain the measurement of standard electrode potential using Calomel electrode. (05 Marks)
- b. A cell is obtained by combining two Cd electrodes immersed in cadmium sulphate solutions of 0.1M and 0.5M at 25°C. Give the cell representation, cell reaction and calculate EMF of the cell. (05 Marks)
- c. Describe the construction and working of — Air battery. (05 Marks)
- d. Explain the construction and working of methanol — oxygen fuel cell. Mention any two applications. (05 Marks)

PART—B

- 3 A. What is stress corrosion? Explain stress corrosion in boilers due to alkali with chemical reactions. (05 Marks)
- How does the following factor affect the rate of corrosion?
i) Nature of corrosion product. ii) Temperature ii) pH. (05 Marks)
- c. Explain the following factors influencing rate of electro — deposit.
i) current ii) metal ion concentration iii) throwing power. (05 Marks)
- d. Explain the process of electroplating of chromium for engineering applications. Indicate the reasons for not employing chromium as anode. (05 Marks)
- 4 a. What is cathodic protection? Explain sacrificial anodic method and impressed current method. (05 Marks)
- Explain the electro chemical theory of corrosion by taking iron as an example. (05 Marks)
- Write a short note on
i) polarisation ii) Decomposition potential (05 Marks)
- d. Explain the process of electroless plating of copper on PCB. (05 Marks)

PART—C

- 5 a. On burning 1.15g of a coal sample in a bomb calorimeter, the temperature of 3.5kg of water in the calorimeter increased from 26.5°C to 28.5°C. Water equivalent of calorimeter is 325g. Specific heat of water 4.187kJ/kg°C. Latent heat of steam = 587 Cal/g. If the fuel contains 4% hydrogen, calculate gross and net calorific values. (05 Marks)

C)

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- b. Explain synthesis of petrol by Fischer Tropseh process. (05 Marks)
 c. Discuss the construction and working of a photovoltaic cell. (05 Marks)
 d. Explain the production of solar grade silicon by Union — Carbide process. (05 Mats)

- 6 a. Define octane number. Explain reformation of petrol with equations. (05 Marks)
 b. What is biodiesel? How is it prepared? What are the advantages? (05 Marks)
 c. What is doping? Explain doping of Si by diffusion Technique. (05 Marks)
 d. Explain the designing of PV cells — Module, panel and Array. (05 Marks)

PART —13

- 7 a. Explain the radical mechanism of polymerisation taking vinyl cyanide as a monomer. (06 Marks)
 b. Differentiate addition and condensation polymerisation. (04 Marks)
 c. Give the synthesis reaction of Teflon and polycarbonate. (04 Marks)
 d. Discuss the synthesis, properties and applications of epoxy resin. (06 Marks)

- S a. Explain the following structure property relationship of polymers. (06 Marks)
 i) Crystallinity ii) Elasticity iii) Platiodefonnation.
 b. Explain the following factors influencing the T_g. (04 Marks)
 i) Flexibility ii) Branching and cross linking
 c. Explain the synthesis of carbon fibre. (04 Marks)
 d. What is conducting polymer? Explain the mechanism of conduction in polyaniline and give the applications. (06 Marks)

PART —E

- a. What is boiler feed water? Explain the priming and foaming in boilers. (05 Marks)
 b. Define COD, Diso. Experimental determination of COD of waste water. (05 Marks)
 c. What is nano material? Discuss the synthesis of nano material by gas condensation and precipitation methods. (05 Marks)
 d. Write a note: Zift carbon nano tubes. (05 Marks)

- 10 a. Explain the activated sludge treatment of sewage water. (05 Marks)
 b. Explain the Desalination of sea water by reverse osmosis. (05 Marks)
 c. Explain the synthesis of nanomaterials by hydro thermal process. (05 Marks)
 d. Write a note on Dendrimers. (05 Marks)

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