

CBCS Scheme

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15CHE12/22

First/Second Semester B.E. Degree Examination, June/July 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. Write Electrode reactions and Net cell reaction of
i) Nickel – Metal hydride battery ii) Methanol – oxygen fuel cell. (06 Marks)
- b. Describe the construction and working of Lithium ion battery. (05 Marks)
- c. Derive Nernst equation for Single Electrode Potential. (05 Marks)

OR

- 2 a. What are Concentration Cells? Calculate the cell potential of the following cell at 298K.
Ag/Ag Cl (0.005M) // Ag Cl (0.5M)/ Ag (06 Marks)
- b. Explain the measurement of electrode potential using Calomel electrode as secondary reference electrode. (05 Marks)
- c. Define Fuel Cell. What are the differences between Fuel cell and Conventional cell? (05 Marks)

Module-2

- 3 a. What is Galvanisation and Tinning? Explain Galvanisation process by Hot dipping method. (06 Marks)
- b. Explain Electrochemical theory of corrosion with an example. (05 Marks)
- c. What is Electroplating? What are the differences between Electroplating and Electroless plating? (05 Marks)

OR

- 4 a. Explain Electroless plating of copper with suitable reactions. (06 Marks)
- b. Describe Electroplating of Nickel using Watt's bath. (05 Marks)
- c. Explain the following factors affecting the rate of corrosion : i) Nature of corrosion product
ii) Ratio of Anodic to Cathodic area iii) Conductivity. (05 Marks)

Module-3

- 5 a. Define Gross calorific and Net calorific value of a fuel. Calculate the gross and net calorific value of a sample of coal from following data : (06 Marks)
Weight of coal = 0.95g ; Weight of water = 2500g ;
Water equivalent of calorimeter = 400g ; Specific heat of water = 4.187 J/g / K ;
Rise in temperature = 3K ; % of Hydrogen in coal = 6
Latent heat of steam = 2454 J/g/K.
- b. Write a short note on Power Alcohol and Biodiesel. (05 Marks)
- c. Explain Modules, Panels and Arrays of photovoltaic cells. (05 Marks)

OR

- 6 a. Explain the production of solar grade silicon by Union Carbide process. (06 Marks)
- b. Explain Doping of silicon by diffusion technique to produce n – type and p – type semiconductors. (05 Marks)
- c. Describe Synthesis of petrol by Fischer – Tropsch process. (05 Marks)

Module-4

- 7 a. Explain Free Radical mechanism of addition polymerisation taking vinyl chloride as an example. (06 Marks)
- b. What are Elastomers? Explain synthesis, properties and applications of silicone rubber. (05 Marks)
- c. What is Glass Transition Temperature? Explain any two factors affecting glass transition temperature. (05 Marks)

OR

- 8 a. A polymer is found to contain the following composition : (06 Marks)
 200 molecules of molecular mass 2000 g/mol ,
 300 molecules of molecular mass 3000 g/mol ,
 500 molecules of molecular mass 5000 g/mol. Calculate number average molecular weight and weight average molecular weight of polymer.
- b. Discuss Structure property relationship of polymers with respect to (05 Marks)
 i) Elasticity ii) Chemical resistivity.
- c. Explain the Mechanism of conduction in polyaniline. (05 Marks)

Module-5

- 9 a. Write a note on Nanocomposites. Mention its applications. (05 Marks)
- b. Discuss the synthesis of nanomaterials by Sol – gel process and by precipitation method. (06 Marks)
- c. Explain the Activated Sludge treatment of sewage water. (05 Marks)

OR

- 10 a. Define BOD. Discuss the experimental determination of BOD of waste water. (06 Marks)
- b. 50cm³ of sewage water was refluxed with 20cm³ of 0.1N acidified K₂Cr₂O₇. The unreacted acidified K₂Cr₂O₇ consumed 10.2cm³ of 0.1NFAS. 20cm³ of 0.1N K₂Cr₂O₇ when titrated under identical condition consumed 31.1cm³ of 0.1NFAS. Calculate the COD of sewage water. (05 Marks)
- c. Write a note on Carbon nanotubes. (05 Marks)

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