

CBCS SCHEME

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17CHE12/22

First/Second Semester B.E. Degree Examination, Dec.2019/Jan.2020 Engineering Chemistry

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- What are ion selective electrodes? Describe the construction of glass electrode with diagram. (07 Marks)
 - Define Single Electrode Potential. Derive the Nernst equation for single electrode potential. (07 Marks)
 - What are Fuel Cells? Give the differences between fuel cell and conventional cell. (06 Marks)

OR

- Explain the following battery characteristics :
i) Energy efficiency ii) Cycle life iii) Self life. (06 Marks)
 - Describe the construction and working of Zn – Air cell. Mention its applications. (07 Marks)
 - What are concentration cells? Calculate the cell potential of the following cell at 298K.
 $C_u | C_u^{2+} (0.001M) || C_u^{2+} (0.1M) | C_u$. Write the cell reactions. (07 Marks)

Module-2

- Explain the following factors affecting the rate of corrosion :
i) Ratio of anodic to cathodic area ii) pH iii) Temperature. (06 Marks)
 - What is Tinning? Explain the process of tinning by hot dipping process. (07 Marks)
 - What is Electroless Plating? Explain electroless plating of copper with suitable reactions. (07 Marks)

OR

- Define Corrosion. Explain Electrochemical theory of corrosion by taking iron as an example. (07 Marks)
 - What is Metal finishing? What are the technological importance of metal finishing. (06 Marks)
 - Explain Electroplating of chromium for decorative and hard deposit. (07 Marks)

Module-3

- What is Cracking? Explain fluidized bed catalytic cracking. (07 Marks)
 - Explain the synthesis of petrol by Fischer Tropsch process. (06 Marks)
 - What are Photovoltaic cells? Explain construction and working of a photovoltaic cell. (07 Marks)

OR

- Define GCV and NCV. Calculate the gross and net calorific value of a sample of coal from the following data :
Weight of coal = 0.80 g ; Weight of water = 2000 g ; Water equivalent of calorimeter = 500g ; Rise in temperature = 2.5°C ; Specific heat of water = 4.187kJ/kg⁰C
% of hydrogen = 5% ; Latent heat of steam = 2457 kJ/kg. (08 Marks)
 - Explain Modules , Panels and Arrays of Photovoltaic cells. (06 Marks)
 - Explain purification of silicon by zone refining process. (06 Marks)

1 of 2

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. What is Polymerization? Explain addition and condensation polymerization with example. (07 Marks)
- b. Explain the synthesis and applications of the following polymers :
i) Polyurethane ii) Silicone rubber. (06 Marks)
- c. What are Polymer composites? Give the synthesis and applications of Kevlar. (07 Marks)

OR

- 8 a. In a polymer sample, 25% of molecules have molecular mass 1000 g/mol, 35% molecules have molecular mass 2000 g/mol and remaining molecules have molecular mass 3000 g/mol. Calculate the number average and weight average molecular mass of the polymer. (06 Marks)
- b. What is Glass transition temperature? Explain any THREE factors affecting the glass transition temperature. (07 Marks)
- c. Explain free radical mechanism of addition polymerization of vinyl chloride. (07 Marks)

Module-5

- 9 a. Explain the Activated Sludge method of treatment of sewage water. (06 Marks)
- b. Define BOD and COD. In a COD test 26.5 cm³ and 15.0cm³ of 0.05N FAS solutions were required for blank and sample titrations respectively. The volume of the test sample used was 25cm³. Calculate the COD of the test sample. (07 Marks)
- c. What are Nano materials? Describe the synthesis of nano material by Sol – gel method. (07 Marks)

OR

- 10 a. What is Desalination? Explain the desalination of sea water by reverse osmosis. (06 Marks)
- b. Explain synthesis of nano materials by chemical vapour condensation process. (06 Marks)
- c. Write a note on the following :
i) Carbon nano tubes and ii) Fullerenes. (08 Marks)
