

CBCS SCHEME

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17CHE12/22

First/Second Semester B.E. Degree Examination, Jan./Feb. 2023 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. Define single electrode potential. Derive the Nernst equation for single electrode potential. (07 Marks)
- b. What are Ion selective electrodes? Explain the determination of P^H of solution by using glass electrode. (06 Marks)
- c. Define battery. Explain the following battery characteristics : (07 Marks)
- i) Capacity
 - ii) Cycle life
 - iii) Energy efficiency.

OR

- 2 a. What are reference electrodes? Explain the construction and working of calomel electrode. (07 Marks)
- b. What are concentration cells? The cell potential of Ag concentration cell, $Ag(s)|AgNO_3(0.02)||AgNO_3(XM)|Ag$ is 0.169V at 25°C calculate the value of X. (06 Marks)
- c. Write any two differences between battery and fuel cell. Explain construction and working methanol – oxygen fuel cell. (07 Marks)

Module-2

- 3 a. What is Corrosion? Explain the electrochemical theory of corrosion with an example. (07 Marks)
- b. Explain how the following factors influence on rate of corrosion : (06 Marks)
- i) Ratio of Anode and cathode
 - ii) Nature of corrosion product
 - iii) Temperature.
- c. Define electroless plating. Describe the electroless plating of Cu on PCB. (07 Marks)

OR

- 4 a. Define metal finishing. Mention the objectives of metal finishing. (06 Marks)
- b. Explain the electroless plating of chromium and mention its applications. (06 Marks)
- c. Describe the following corrosion controlling techniques : (08 Marks)
- i) Galvanizing
 - ii) Anodizing.

Module-3

- 5 a. Define Cracking. Explain the Fluidized bed Catalytic Cracking (FCC) with a neat diagram. (07 Marks)
- b. Define gross calorific value. Calculate GCV and LCV of 0.65g of coal sample containing, 3% H_2 which was subjected to combustion in a bomb calorimeter. Mass of water taken in the calorimeter was 1500g and water equivalent of calorimeter was 250g and the rise in temperature was 2.5°C. Given specific heat of water is 4.187 KJ/kg/°C and latent heat of steam is 2454 kJ/kg. (07 Marks)
- c. Define Photovoltaic Cell. Explain the construction and working of photovoltaic cell. (06 Marks)

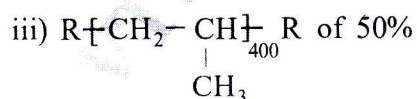
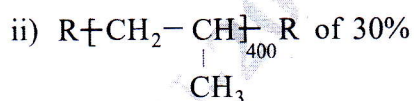
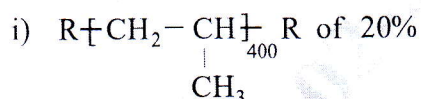
Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. What is Knocking? Explain the mechanism of knocking in IC engine. (06 Marks)
 b. Explain the production of synthetic petrol by Fischer – Tropsch process. (07 Marks)
 c. Explain the production of solar grade silicon (Si) by union carbide process with relevant reactions. (07 Marks)

Module-4

- 7 a. Describe the free radical mechanism of addition polymerization of Poly Vinyl Chloride. (06 Marks)
 b. What is glass transition temperature (T_g)? Explain any three factors influence on T_g and mention its any two significance. (08 Marks)
 c. A polymer of polypropylene is found to have the following composition :



Calculate the number average (\bar{M}_n) and weight average (\bar{M}_w) molecular masses of the polymer. (Given : atomic mass of C = 12, H = 1, neglect the mass of R). (06 Marks)

OR

- 8 a. What is polymerization? Explain the addition and condensation polymerization with an example. (05 Marks)
 b. Write the synthesis and applications of the following polymers :
 i) Silicone rubber
 ii) Polyurethane. (08 Marks)
 c. What are polymer composites? Explain the synthesis, properties and applications of Kevlar fiber. (07 Marks)

Module-5

- 9 a. Discuss the purification of water by :
 i) Electro dialysis
 ii) Reverse osmosis. (07 Marks)
 b. Define COD and calculate the COD of the effluent sample when 25ml of effluent requires 8.9ml of 0.001M $K_2Cr_2O_7$ for complete oxidation. (07 Marks)
 c. Explain any three size dependent properties of nanomaterials. (06 Marks)

OR

- 10 a. What are boiler scale and sludge? List out their disadvantages and mention preventive methods. (05 Marks)
 b. What are nanomaterials?. Explain the gas condensation method of preparation of nanomaterials. (08 Marks)
 c. What is domestic sewage? Describe the sewage treatment with neat diagram. (07 Marks)

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