

CBCS SCHEME

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CHE12/22

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

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Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define Free Energy. Derive Nernst equation for single electrode potential. (07 Marks)
- b. What are Reference Electrodes? Describe the construction and working of Calomel electrode. (06 Marks)
- c. Explain the construction and working of Ni — Metal Hydride battery. Give the reaction during charging and discharging mode. Give any two applications_ (07 Marks)

OR

- 2 a. Describe the construction and working of Lithium — ion battery. Give its applications. (07 Marks)
- b. Write a note on Primary, Secondary and Reserve batteries. (06 Marks)
- c. What are Concentration Cells? EMF of the cell $\text{Ag}/\text{AgNO}_3(\text{C}_1) // \text{AgNO}_3(\text{C}_2 = 0.2\text{m}) / \text{Ag}$ is 0.8V Calculate C_1 of the cell. (07 Marks)

Module-2

- 3 a. What is Corrosion? Explain the Electrochemical theory of corrosion by taking iron as an example. (07 Marks)
- b. Explain i) Differential Metal Corrosion ii) Pitting Corrosion. (07 Marks)
- c. What do you mean by metal finishing? Mention any five technological importances. (06 Marks)

OR

- 4 a. Define and explain any two terms :
i) Polarisation ii) Decomposition potential iii) Over voltage. (06 Marks)
- b. What is Electroless Plating? Explain the Electroless plating of copper. (07 Marks)
- c. Explain the process of Galvanization. (07 Marks)

Module-3

- 5 a. What is Knocking? Explain the mechanism. (07 Marks)
- b. On burning 0.96 grams of solid fuel in bomb calorimeter the temperature of 3500 grams of water increased by 2.7°C water equivalent of calorimeter and latent heat of steam are 385 grams and 587 cal/gram respectively. if the fuel contains 5% H_2 , calculate its gross and net calorific value. Specific heat of water = 4.187 kJ/kg K. (06 Marks)
- c. What are Fuel Cells? Describe the construction and working of CH_3OH — fuel cell. (07 Marks)

OR

- 6 a. What are Solar Cells? Explain the construction and working of a typical P.V. Cell. (07 Marks)
- b. Explain the production of solar grade Si by Union Carbide Process. (07 Marks)
- c. Write a note on : i) Power alcohol ii) Unleaded petrol. (06 Marks)

18CHE12/22

Module-4

- 7 a. What are the main sources, effects and control of lead pollution? (07 Marks)
b. Mention the various causes, effects and disposal methods of e — waste. (07 Marks)
c. 50 mC of an industrial sewage has consumed 11.5 mf of 0.4N $K_2Cr_2O_7$ solution for complete oxidation. Calculate C.O.D of industrial sewage. (06 Marks)

OR

- 8 a. Explain the activated sludge treatment of sewage water_ (07 Marks)
b. What is Desalination? Describe the desalination of seawater by reverse Osmosis process. (07 Marks)
c. Write a note on Ozone depletion. (06 Marks)

Module-5

- 9 a. Explain the theory, Instrumentation and Application of Calorimetry. (06 Marks)
b. What is Potentiometric titration? Explain the principle involved in Potentiometric titration. (07 Marks)
c_ Write a note on Fullerene. Mention its application. (07 Marks)

OR

- 10 a_ What are Nano — materials? Give their synthesis by Sol — gel techniques. (07 Marks)
b. Write a note on Graphenes. Mention their applications. (07 Marks)
c_ Explain the theory and applications of Atomic Absorption Spectroscopy. (06 Marks)

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