CBCS SCHEME

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18CHE12/22

First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025
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. Derive Nernst equation for electrode potential. **(06 Marks)**

b. What is ion selective electrode? Explain the construction and working of a glass electrode with advantages. **(08 Marks)**

c. Discuss the construction, working and application of Ni-MH battery. **(06 Marks)**

OR

2 a. Discuss the construction, working and application of Li-ion battery. **(07 Marks)**

b. Discuss the classification of batteries with examples. **(06 Marks)**

c. What is reference electrode? Explain the construction working and application of calomel electrode. **(07 Marks)**

Module-2

3 a. Define Corrosion. Explain electro chemical theory of corrosion. **(07 Marks)**

b. Explain the following factors :
i) Ratio of anodic and cathodic region
ii) Nature of corrosion product. **(07 Marks)**

c. Discuss the electroplating of chromium (Hard). **(06 Marks)**

OR

4 a. What is metal finishing? Mention the technological importance of metal finishing. **(06 Marks)**

b. Explain Galvanisation of Iron. **(07 Marks)**

c. Discuss the electroless plating of Nickel. **(07 Marks)**

Module-3

5 a. What is knocking? Explain its mechanism. **(07 Marks)**

b. Briefly discuss the construction, working and applications of methanol-oxygen fuel cell. **(07 Marks)**

c. Explain the production of solar grade silicon by Union – Carbide process. **(06 Marks)**

OR

6 a. 0.75g of coal sample containing 2% hydrogen, when burnt in bomb calorimeter, increased the temperature of 2.7 kg water from 27.2°C to 29.7°C. If the water equivalent of calorimeter is 1.2 kg, calculate the higher and lower calorific value. (Specific heat of water = 4.187 kJ/kg/°C, Latent heat of steam = 2454 kJ/kg). **(08 Marks)**

b. What is photovoltaic cell? Explain the construction and working photovoltaic cell. **(06 Marks)**

c. Discuss the advantages and disadvantages of PV cells. **(06 Marks)**

Module-4

7 a. What are the sources of CO and particulate matter? Mention their harmful effects. Indicate the measures to control carbon monoxide. **(07 Marks)**

b. Explain the following in brief :
i) Scientific land filling
ii) Composting
iii) Recycling. **(08 Marks)**

c. Calculate the COD of the effluent sample when 25 CC of effluent sample requires 8.5 CC of 0.001N $K_2Cr_2O_7$ soln. for complete oxidation. **(05 Marks)**

OR

8 a. Write a note on :
i) Ozone depletion
ii) SO_2 pollution **(05 Marks)**

b. Define COD. Discuss the experimental determination of COD of waste water. **(08 Marks)**

c. Explain the activated sludge treatment of sewage water. **(07 Marks)**

Module-5

9 a. State Beer-Lambertz law. Explain the instrumentation and applications of calorimetry. **(08 Marks)**

b. Draw and explain the conductometric titration curve for the following titrations.
i) Strong acid and strong base **(06 Marks)**
ii) Strong acid and weak base **(06 Marks)**

c. Explain the Sol-gel processes of synthesis of nanomaterials.

OR

10 a. Explain the synthesis of nanomaterials by chemical vapour deposition method. **(06 Marks)**

b. Write a note on Fullerenes, CNT and graphene. **(08 Marks)**

c. What are potentiometric titrations? Discuss the estimation of potentiometry in the estimation of FAS using std $K_2Cr_2O_7$ soln. **(06 Marks)**

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