

**Model Question Paper-1 with effect from 2018-19
(CBCS Scheme)**

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18CHE12/22

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

(Common to all Branches)

Time : 3 Hrs

Max.Marks:100

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

Module-1

1. a. Define the terms: (i) Free energy, (ii) Entropy & (iii) Cell potential **(6 Marks)**
- b. What are concentration cells? The cell potential of Cu concentration cell $\text{Cu}/\text{CuSO}_4(0.005\text{M}) // \text{CuSO}_4(\text{X})/\text{Cu}$ is 0.0295 V at 25° C.
Write the cell reaction and calculate the value of X. **(7 Marks)**
- c. What are batteries? Explain the construction and working of Li-ion battery, mention its applications. **(7 Marks)**

OR

2. a. Write short notes on primary, secondary and reserve batteries. **(6 Marks)**
- b. Explain the construction and working of Ni-MH battery. Mention its applications. **(7 Marks)**
- c. For the cell, $\text{Fe}/\text{Fe}^{2+}(0.01\text{M})//\text{Ag}^+(0.1\text{M})/\text{Ag}$ write the cell reaction and calculate the emf of the cell at 298K, if standard electrode potentials of Fe and Ag electrodes are -0.44V and 0.8 V respectively. **(7 Marks)**

Module-2

3. a. What is metallic corrosion? Describe the electrochemical theory of corrosion taking iron as an example. **(7 Marks)**
- b. Explain: (i) Differential metal corrosion & (ii) Water-line corrosion **(6 Marks)**
- c. What is electroplating? Explain the electroplating of chromium **(7 Marks)**

OR

4. a. What is meant by metal finishing? Mention (any five) technological importance of metal finishing. **(6 Marks)**
- b. What is electroless plating? Explain the electroless plating of copper. **(8 Marks)**
- c. Explain the factors affecting the rate of corrosion (i) Nature of corrosion product, (ii) Ratio of anodic to cathodic areas & (iii) pH **(6 Marks)**

Module-3

5. a. Define the term Calorific value of fuel. Explain the experimental determination of calorific value of solid/liquid fuel using Bomb calorimeter. (8 Marks)
- b. What are fuel cells? Describe the construction and working of $\text{CH}_3\text{OH}-\text{O}_2$ fuel cell. (6 marks)
- c. What are solar cells? Explain the construction and working of a typical PV cell. (6 marks)

OR

6. a. Explain the production solar grade Si by union carbide process (6 marks)
- b. 0.75 g of coal sample (carbon 90%, H_2 5% and ash 5%) was subjected to combustion in Bomb calorimeter. Mass water taken in the calorimeter was 2.5Kg and the water equivalent of calorimeter is 0.65Kg. The rise in temperature was found to be 3.2°C . Calculate gross and net calorific values of the sample. Latent heat of steam = 2457KJ/Kg and specific heat of water = $4.187\text{KJ/ Kg}^\circ\text{C}$. (8 Marks)
- c. What is knocking? Explain its mechanism. Mention its ill effects. (6 Marks)

Module-4

- 7 a. Explain the mechanism of photochemical smog? (7 Marks)
- b. What are the sources, effects and control of lead pollution? (7 Marks)
- c. Define COD. In COD test 27.5 cm^3 and 13.2 cm^3 of 0.05 N FAS solution are required for blank and sample titration respectively. The volume of the test sample used is 25 cm^3 . Calculate the COD of the sample solution. (6 Marks)

OR

8. a. Define the term COD. Explain the determination of COD. (6 Marks)
- b. What is potable water? Describe the process of reverse osmosis process of water. (7 Marks)
- c. What are the causes, effects and disposal methods of e-waste? (7 Marks)

Module-5

9. a. Explain the theory, instrumentation and applications of flame photometry. (7 Marks)
- b. Explain the theory and instrumentation of conductometry. (7 Marks)
- c. Explain the synthesis of nano-material by sol-gel technique. (6 Marks)

OR

10. a. Write a note on graphenes. Mention its applications. (7 Marks)
- b. What are nano-materials? Explain the synthesis of nano-materials by precipitation method (7 Marks)
- c. Explain the theory and instrumentation of potentiometry. (6 Marks)