USN ☐☐☐☐☐☐☐☐☐☐

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-I

1. a. What is single electrode potential? Derive Nernst equation for single electrode potential.
(6 Marks)

  b. Calculate the emf of a Cd-Cu cell in which Cd is in contact with 0.002 M $CdSO_4$ and Cu in contact with 0.02 M CuSO4 solution. The standard emf of the cell is 0.74 V at 298 K **(7 Marks)**

  c. Explain the construction and working of Ni-MH battery, mention its applications.
(7 Marks)

OR

2. a. Explain the construction and working of Li-ion battery. Mention their advantages and applications. **(7 Marks)**

  b. What are primary and secondary batteries? Explain with examples. (**6 Marks**)

  c. A concentration cell was constructed by immersing two silver electrodes in 0.05 M and 1M $AgNO_3$ solutions. Give the cell representation, write the cell reactions and calculate the emf of the cell (**7 Marks**)

Module-II

3. a. Explain: (i) Water-line corrosion & (ii) Pitting corrosion. **(6 Marks)**

  b. Explain the process of (i) galvanization & (ii) Anodizing (**7 Marks**)

  c. What is electrolessplating? Explain the electrolessplating of nickel. **(7 Marks)**

OR

4. a. What is meant by metal finishing? Mention (any 6) technological importance of metal finishing. **(7 Marks)**

  b. Define the terms (i) Polarization, (ii) Decomposition potential & (iii) Over voltage.
(6 Marks)

  c. What is cathodic protection? Explain (i) Sacrificial anodic & (ii) Impressed current methods **(7 Marks)**

Module-III

5. a. What are chemical fuels? How are they classified? **(6 Marks)**

   b. What are fuel cells? How does a fuel cell differ from a battery? Give their advantages & disadvantages. **(7 marks)**

   c. Explain the preparation of solar grade silicon by union carbide process. **(7 marks)**

OR

6. a. What are PV cells? Mention their advantages and limitations. **(6 marks)**

   b. 0.85 g of coal sample (carbon 90%, H_2 5% and ash 5%) was subjected to combustion in a Bomb calorimeter. Mass water taken in the calorimeter was 2000 g and the water equivalent of calorimeter was 600 g. The rise in temperature was found to be 3.5^oC. Calculate gross and net calorific values of the sample. Latent heat of steam =2457KJ/Kg. **(8 Marks)**

   c. Write a note on (i) Power alcohol & (ii) Unleaded petrol **(6 Marks)**

Module-IV

7 a. What are the causes, effects and disposal methods of e-waste? **(7 Marks)**

   b. What are the sources, effects and control of mercury pollution? **(7 Marks)**

   c. In a COD test 30.2 cm^3 and 14.5 cm^3 of 0.05 N FAS solution are required for blank and sample titration respectively. The volume of the test sample used was 25 cm^3. Calculate the COD of the sample solution. **(6 Marks)**

OR

8. a. Explain the softening of water by ion exchange method. **(6 Marks)**

   b. Explain the activated sludge treatment of sewage of water. **(7 Marks)**

   c. Explain the mechanism of photochemical smog. **(7 Marks)**

Module-V

9. a. Explain the theory, instrumentation and applications of atomic absorption spectroscopy. **(7 Marks)**

   b. Explain the theory and instrumentation of potentiometry **(7 Marks)**

   c. Explain the synthesis of nano-material by sol-gel technique. **(6 Marks)**

OR

10. a. Write a note on fullerenes. Mention their applications. **(7 Marks)**

    b. What are nano-materials? Explain the synthesis of nano-materials by chemical vapor deposition. **(7 Marks)**

    c. Explain the theory and instrumentation of colorimetry. **(6 Marks)**