CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐   18CHE12/22

First/Second Semester B.E. Degree Examination, Jan./Feb. 2021
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. What is single electrode potential? Derive Nernst equation for single electrode potential.
(07 Marks)

   b. What are electrolyte concentration cells? Calculate the cell potential of the following call at 298 K.
      $Ag \mid AgNO_3(0.005M) \parallel AgNO_3(0.5M) \mid Ag$
(06 Marks)

   c. Explain the construction and working of Ni-MH battery. Mention its applications. (07 Marks)

OR

2 a. What are primary, secondary and reserve batteries? Explain with examples. (06 Marks)

   b. Explain the construction and working of Li-ion battery. Mention its applications. (07 Marks)

   c. What is glass electrode? Explain the determination of pH using glass electrode. (07 Marks)

Module-2

3 a. Define metallic corrosion. Explain the electrochemical theory of corrosion taking iron as an example. (07 Marks)

   b. Explain : (i) Waterline corrosion and
              (ii) Galvanic corrosion. (06 Marks)

   c. What is electroplating? Explain the electroplating of chromium. (07 Marks)

OR

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

   b. What is electroless plating? Explain the electroless plating of copper with relevant reactions. (07 Marks)

   c. What is cathodic protection? Explain (i) Sacrificial anode   (ii) Impressed current methods (07 Marks)

Module-3

5 a. Define gross calorific and net calorific of a fuel. Calculate GCV and NCV of a sample of a coal from the following data:
      Mass of fuel taken = 0.75 g,
      Mass of water in the copper calorimeter = 2.5 kg
      Water equivalent of calorimeter = 0.485 kg
      Increase in temperature of water = 4°C
      Specific heat of water = 4.187 kJ/kg/°C
      Latent heat of steam = 587 × 4.187 KJ/kg
      Percentage of hydrogen in fuel sample = 2.5 (07 Marks)

   b. What are fuel cells? Describe the construction and working of Methanol-oxygen fuel cell. (07 Marks)

   c. What are PV cells? Mention their advantages and limitations. (06 Marks)

OR

6 a. What is knocking? Explain its mechanism. **(06 Marks)**
   b. What is chemical fuel? Explain the experimental determination of calorific value of solid / liquid fuel using Bomb calorimeter. **(07 Marks)**
   c. Explain the preparation of Solar grade silicon by union carbide process. **(07 Marks)**

Module-4

7 a. What is desalination of water? Describe the process of reverse osmosis of sea water. **(07 Marks)**
   b. 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. **(06 Marks)**
   c. Mention the sources of sulphur dioxide pollution. Write down its ill effects and control measure. **(07 Marks)**

OR

8 a. Explain the activated sludge treatment and sewage water. **(06 Marks)**
   b. What are the sources, effects and control of lead pollution? **(07 Marks)**
   c. What are the causes, effects and disposal methods of e-waste? **(07 Marks)**

Module-5

9 a. Explain the theory, instrumentation and application of conductometry. **(07 Marks)**
   b. Explain the theory and instrumentation of potentiometry. **(07 Marks)**
   c. Explain the synthesis of nanomaterial by sol-gel technique. **(06 Marks)**

OR

10 a. What are nanomaterials? Explain the synthesis of nanomaterials by precipitation method. **(07 Marks)**
   b. What are fullerenes? Write any four applications of fullerenes. **(06 Marks)**
   c. Explain the theory and instrumentation of colorimetry. **(07 Marks)**

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