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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