USN ⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜   17CHE12/22

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
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 are ion selective electrodes? Discuss the construction and working of a glass electrode.
         (07 Marks)
    b.   Define Battery. Explain construction, working and uses of (Ni – Metal Hydride) battery.
         (07 Marks)
    c.   What are fuel cells? How it is different from a galvanic cell? Mention any two advantages of fuel cell.
         (06 Marks)

OR

2   a.   Derive Nernst equation for electrode potential.   **(06 Marks)**
    b.   What are concentration cells? The emf of the cell
         $$Ag \mid AgNO_3 \ (0.0083M) \parallel AgNO_3 \ (XM) \mid Ag$$
         was found to be 0.074 V at 298 K. Calculate the value of X and write the cell reactions.
         (07 Marks)
    c.   Describe the construction, working and applications of methanol –oxygen fuel cell.
         (07 Marks)

Module-2

3   a.   Define corrosion. Explain electrochemical theory of corrosion by taking Iron as an example.
         (07 Marks)
    b.   What is Cathodic protection? Explain Sacrificial Anode and Impressed Current method for prevention of corrosion.   **(07 Marks)**
    c.   Define electroless plating. What are the differences between electroplating and electroless plating?   **(06 Marks)**

OR

4   a.   How does the following factors affect the rate of corrosion?
         (i)   Nature of the corrosion product
         (ii) Temperature
         (iii) pH.   **(06 Marks)**
    b.   Explain the process of electroplating of chromium and its applications.   **(07 Marks)**
    c.   Discuss the process of electroless plating of copper and explain its application in the manufacture of Printed Circuit Board (PCB).   **(07 Marks)**

Module-3

5   a.   Define Gross and Net calorific values of a solid on a liquid fuel. Calculate the gross and net calorific value of a sample of coal 0.5 g of which when burnt in a bomb calorimeter raised the temperature of water from 293 K to 296.4 K. The mass of water is 1000 g and water equivalent of calorimeter is 350 g. The specific heat of H_2O is 4.187 kJ/kg/K, latent heat of steam is 2454 kJ/kg. The coal sample contains 93% carbon, 5% hydrogen and 2% ash.
         (07 Marks)

b. What is meant by knocking? What are its ill effects? Discuss the mechanism of knocking by giving relevant equations. **(07 Marks)**

c. Explain the construction and working of a PV cell. **(06 Marks)**

OR

6   a. What is cracking of petroleum? Describe the fluidized bed catalytic cracking. **(07 Marks)**

b. Explain the production of solar grade silicone by Union Carbide process. **(07 Marks)**

c. Write a note on :
    (i) Power alcohol   (ii) Biodiesel. **(06 Marks)**

Module-4

7   a. What is addition polymerization? Illustrate the mechanism of addition polymerization by taking Vinyl Chloride as an example. **(07 Marks)**

b. Describe the manufacture of (i) PMMA (ii) Epoxy resin. Mention the uses. **(07 Marks)**

c. A polymer sample containing 100, 250 and 300 molecules having molar mass 10^3 g/mol, 10^4 g/mol and 10^5 g/mol respectively. Calculate the number average and weight average molecular mass of polymer. **(06 Marks)**

OR

8   a. What is glass transition temperature? Explain any three factors affecting T_g. **(07 Marks)**

b. What are elastomers? Give the synthesis and applications of
    (i) Silicone rubber   (ii) Polycarbonate. **(07 Marks)**

c. What are conducting polymers? Discuss the conduction mechanism in polyaniline. **(06 Marks)**

Module-5

9   a. Define Priming and Foaming. Mention the reasons for priming and foaming in the boiler with any two prevention steps. **(07 Marks)**

b. What is desalination? Explain the desalination of water by reverse osmosis. **(06 Marks)**

c. Describe the synthesis of nano-materials by Sol-gel process. **(07 Marks)**

OR

10 a. Define COD. In COD test 25.5 cm^3 and 12.5 cm^3 of 0.05N FAS solution and 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. **(07 Marks)**

b. Explain the precipitation method for preparation of nanomaterials with an example. **(07 Marks)**

c. Write a note on Fullerenes and Composites. **(06 Marks)**

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