KHAJABANDANAWAZ UNIVERSITY

FACULTY OF ENGINEERING AND TECHNOLOGY KALABURGI

DEPARTMENT OF ENGINEERING CHEMISTRY

MODULE QUESTION PAPER I

Time : 3 hrs   Marks : 100

SECTION A

I   Answer any TEN of the following Questions   (20 MARKS)

1.   Define electrochemistry with an example

2.   Define electrode potential & cell

3.   Define EMF & give the equation for EMF or Ecell

4.   Define polymerization with an example

5.   Define degree of polymerization

6.   Define 1.Homopolymer 2.copolymer with example

7.   What is corrosion ? give an example

8.   Define electro chemical theory of corrosion

9.   What is galvanic series

10.   What is a fuel and give the examples

11.   Define calorific value

12.   What are high calorific value and lower calorific value

13.   What is boiler feed water

14.   Define scale and sludge formation

15.   What is priming and foaming

SECTION B

II   Answer any FIVE FULL Questions from the following   (8 MARKS EACH)

1. a) Explain in brief the classification of electrochemical cell with examples   (4M)

     b).Explain the measurement or determination of pH using glass electrode (4M)

2.   a) Explain the different types of polymerization   (4M)

        b) How molecular weight of polymer is determined   (4M)

3.   a) Explain differential metal corrosion   (4M)

        b) Explain Waterline corrosion & Pitting corrosion   (4M)

4   a)   Give the classification of fuels   (4M)

        b) Explain the synthesis of petrol by Fischer tropsch   process   (4M)

5   a) Discuss in brief boiler corrosion   (4M)

        b) Explain in brief about priming and foaming and its prevention   (4M)

6.   a)Explain the measurement or determination of pH using glass electrode (4M)

        b) the difference between electro plating and electro less plating   to.   (4M)

7   a)Explain in brief about power alcohol and biodiesel   (4M)

     b)Explain the desalination of sea water by reverse osmosis   (4M)

8   a)Explain in brief electro less plating of copper   (4M)

      b)   Explain in brief the classification of nanomaterial's   (4M)

SECTION C

III ANSWER ANY FOUR FULL QUESTIONS FROMTHEFOLLOWING   (10 MARKSEACH

1   a) Derive Nernst equation for electrode potential   (5 M)

        b)A concentration cell was constructed two silver electrodes in 0.01 M AND 10 M silver nitrate solution. Write the cell reaction and calculate the Emf of the concentration cell (5M)

2   a).Explain the mechanism of conducting in polyaniline   (4 M)

        b) In a polymer sample 100 molecules have molecular weight of 10^3 g/mol , 250 molecules have molecular weight of 10^4g/mol and 300 molecules have molecular weight of 10^5 g/mol calculate Number average molecular weight and weight average molecular weight and polymer dispersity index   (6 M)

3   a)Explain the electrochemical theory of corrosion taking rusting of iron as an   example (6M)

        b)   Explain any two factors affecting the rate of corrosion.   (4M)

4   a)   Explain the experimental determination of calorific value of solid/liquid fuel using bomb calorimeter   (5 M)

        b) 0.75 g of coal sample (c-90 %, H-5 % and ash- 5 %) was subjected to combustion in Bomb calorimeter. Mass of water taken in calorimeter was 2.5 Kg and water equivalent of calorimeter is 0.65 Kg . The rise in temperature was found to $3.2^.$ c calculate Higher and Lower calorific value of the sample .Latent heat of steam =2457 KJ/Kg and specific heat of water is 4.187 KJ/Kg/·c   (5M)

5   a)   Explain the activated sludge treatment of sewage water   (5 M)

        b) In a COD test, 30.2 cm^3 and 14.5cm^3 of 0.05 N FAS solutions are required for a Blank and Sample titration respectively. The volume test sample used was 25 cm^3 . Calculate the COD of the sample solution.   (5 M)

6 a)   Explain the synthesis of nanomaterial's by sol gel technique.   (5 M)

    b) Describe the construction and working of solid oxide fuel cell (SOFC) and mention its application.   (5M)

7. a) Write a note batteries. (5 M)

 b) Write a Note on Carbon nanotubes and Fullerence (5 M)

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MODULE QUESTION PAPER II

TIME :3 hrs   Marks :100

SECTION A

I Answer any TEN Questions from the following   (2 MARKS EACH)

1.Define reference electrode with suitable example

2.Define concentration cell

3.Define battery with an examples

4.Define glass transition temperature (Tg)

5.Define conducting polymer

6.Define elasticity

7.Define Sacrificial anode and impressed current method

8.Define metal finishing with suitable example

9.Define electroplating and elctrolessplating with example

10.Whatis knocking

11What are anti knocking agent

12 Define fuel cell with an example

 13   Define dissolved oxygen

14   What is softening of water?

15 Define nanomaterial with an example

Section B

II Answer any FIVE full Question from the following   (8 MARKS EACH)

1. a)Discuss in brief the construction and working of calomel electrode (4M)

   b) Give an EMF equation for concentration cell   (4M)

2 a)Discuss in brief the significance of Tg   (4M)

   b) discuss in brief any three structure property relationship of polymer   (4M)

3 a)Explain galvanization process   (4M)

 b)Explain in brief the sacrificial anode and impressed current method   (4M)

4 a) Write the difference between convention cell and fuel cell   (4M)

   b)Explain the mechanism knocking and harmful effects of knocking (4M)

5 a)Explain the desalination of sea water by reverse osmosis   (4M)

   b) Explain the reformation of petrol   (4M)

 6 a)Explain tinning process   (4M)

   b) Explain electroplating of nickel (watts bath)   (4M)

7 a)   Describe the synthesis of Polyurethane and its applications   (4M)

   b) Describe fluidized bed catalytic cracking   (4M)

8 a) write a note on nano wiers and nano composites.   (4M)

  b) explain in brief about impurities of water   (4M)

SECTION C

III   Answer any FOUR FULL question from the following   (10MARKS EACH)

1 a)Explain construction working and application of nickel metal hydride battery (5M)

   b)The cell potential of concentration cell Cu / $CuSo_4$ (0.005 M) // $CuSo_4$ (X) / Cu is 0.0295 V at 25. C. Calculate the value of X.   (5m)

2 a)Explain the mechanism of conducting in polyaniline.   (4 M)

   b) A polymer has following composition , 100 molecules of molecular mass 1000 g/mol,200 molecules of molecular mass 2000 g/mol and 500 molecules of molecular mass 5000 g/mol. Calculate the number and weight average molecular weight   (6 M)

3 a) Mention any five technological importance of metal finishing   (4M)

   b)explain in brief about effect of corrosion rate by 1) ph 2) conductivity 3) temperature (6M)

4 a) Explain classification of fuel cell based on 1. Temperature 2. Fuel 3. Electrolyte (5 M)

   b) 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 water is 4.187 kJ/kg/K ,latent heat of steam is 2454 kJ/kg. coal sample contains 93 % carbon, 5% hydrogen and 2 % ash.   (5 M)

5 a) Explain the prevention of boiler corrosion   (5 M)

   b) In a COD tests 32.7 cm^3 and 23.5 cm^3 of 0.02 N FAS solution are required for blank and sample titration respectively. The volume of test sample is 25 cm^3. Calculate the COD of solution   (5 M)

6 a)Describe the construction working of lithium ion batteries mention its application (6 M)

   b) Explain any TWO structure property relationship of polymers   (4 M)

7 a)   Explain the construction and working of methanol oxygen fuel cell.   (5 M)

   b)   Explain wrenkler's method of determining dissolved oxygen (5M)