SEM 1 – 2B (RC 16-17)

F.E. Semester I (RC 2016-17) Examination, Nov./Dec. 2017
APPLIED SCIENCE (Chemistry)

Duration : 3 Hours | Total Marks : 100

Instructions : *1) Answer **any two** questions **each** from Part – **A** and Part – **B**. Answer **any one** question from Part – **C**.*
*2) **Draw** diagrams **wherever** necessary.*
*3) **Assume** additional data **if required**.*

PART – A

Answer **any two** questions.

1. a) Sketch the electrochemical cell and write the cell reactions if Zn and Ag electrodes are dipped in their respective salt solutions ie Zn dipped in 0.001 M solution and Ag dipped in 0.01 M solution.
   Find out the cell potential (Given $E^0_{2n} = -0.76$ V and $E^0Ag = 0.80$ V). **6**
   b) State and explain factors affecting rate of corrosion due to nature of metal. **6**
   c) Explain the construction and working of photovoltaic cell. **4**
   d) Define the term 'Green Chemistry' and mention the objectives of green chemistry. **4**

2. a) Explain the method for determination of pH of a given solution using Glass electrode. **6**
   b) Outline the mechanism involved in electrochemical process of corrosion when the metal is in contact in a medium of neutral pH. **6**
   c) With the help of a neat labelled diagram explain 'mining of petroleum'. **4**
   d) Discuss any two applications of green chemistry for achieving sustainable development. **4**

3. a) The following cell $Ag/Ag^+//Ag^+/Ag$ was used in order to obtain electrical (0.01M) (0.1M) energy. State the principle behind working of this cell and calculate its EMF. **6**
   b) Briefly explain any 6 characteristics of battery. **6**

P.T.O.

c) Define the term octane and cetane number. Mention the importance of these terms in petroleum industry. 4

d) Explain with example the use of alternative solvent in achieving the goals of green chemistry. 4

PART – B

4. a) Outline the classification of polymers based on :

i) Structure.

ii) Number and arrangements of monomeric units.

iii) Response to heat and pressure. 6

b) Explain any one large scale process for desalination of waters. 6

c) With the help of a block diagram explain the working of gas chromatography. 4

d) Define the term 'composites' and mention the various constituents of composites. 4

5. a) Explain the bulk and suspension methods of polymerisation. 6

b) Explain the primary, secondary and tertiary treatment methods of sewage water. 6

c) State the basic principle involved in working of UV-visible spectroscopy and draw the block diagram of the spectrophotometer. 4

d) Outline the various applications of composite materials. 4

6. a) State the various ingredients involved in compounding of polymers to yield a plastic material, also state their role and give one example each. 6

b) 50 ml of a sample of water required 5 ml of N/50 H_2SO_4 using methyl orange as indicator but did not give any colouration with phenolphthalein. What type of alkalinity is present ? Express the same in PPM. 6

c) Draw the block diagram for UV-visible spectrophotometer and differential scanning calorimeter. 4

d) Briefly describe the constituents of composites. 4

PART – C

Answer **any one** question :

7. a) With the help of a suitable example, explain the construction of a Galvanic cell. Write its representation, reactions involved and calculate its EMF. **5**

   b) Explain pitting corrosion by giving suitable examples along with necessary diagrams and reactions involved. **5**

   c) Explain the processing of natural rubber and state the advantages of synthetic rubber in comparison to natural rubber. **5**

   d) Define the term COD of water 20 ml of sewage sample for COD is reacted with 25 ml of $K_2Cr_2O_7$ solution and the unreacted $K_2Cr_2O_7$ requires 10 ml of N/u FAS solution. Under similar conditions, in blank titration 16.0 ml of FAS is used up. Calculate the COD of the sample. **5**

8. a) Explain the municipal treatment of raw water for preparing potable water. **5**

   b) Outline the construction and working of hydrogen oxygen fuel cell. **5**

   c) Explain how the structure of the polymer influences the following properties :

      i) Crystallinity.

      ii) Glass transition temperature. **5**

   d) Mention any five proper designing principles to be followed for corrosion control. **5**
