

SEM 1 – 2 (A) (RC 2016-17)

F.E. (Semester – I) (RC 2016 – 17)
Examination, November/December 2016
APPLIED SCIENCE
(Chemistry) – (New)

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.

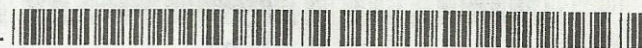
3) Assume additional data **if** required.

PART – A

Answer **any two** questions.

1. a) A Galvanic cell is formed using Zinc and Nickel electrodes. Write the cell representation, half cell reactions and calculate the EMF of the cell. Assume suitable concentrations for the electrolyte.
(Data : $E^\circ_{\text{Zn}} = -0.76 \text{ v}$; $E^\circ_{\text{Ni}} = -0.23 \text{ v}$). 6
- b) Explain any one suitable method for protection against corrosion of an underground pipeline made up of Iron material. 6
- c) How are fuels classified ? Define the terms G.C.V and N.C.V. 4
- d) Outline the objectives of Green Chemistry. 4
2. a) Outline the construction and working of Li-ion polymer battery. 6
- b) Explain the process of rusting of Iron with the help of Dry Chemical theory of Corrosion. 6
- c) Describe the synthesis of Biogas from waste materials using anaerobic method. 4
- d) Discuss any two applications of Green Chemistry for achieving Sustainable development. 4
3. a) Explain the method for determination of pH of a given solution using Glass Electrode. 6
- b) Explain the method of corrosion protection by using metallic coatings. 6

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- c) With the help of a neat labeled diagram explain the Fractional distillation of crude oil. 4
- d) Explain with example the use of alternate feedstock in achieving the goals of green Chemistry. 4

PART – B

Answer **any two** questions.

4. a) Explain the structure and Chemical Property relationship in polymers. 6
- b) Explain any one large scale process for desalination of water. 6
- c) Explain the working of Differential Scanning Calorimeter (DSC) with the help of a suitable block diagram. 4
- d) Briefly describe the constituents of Composites. 4
5. a) Explain the Bulk and Suspension methods of Polymerization. 6
- b) Explain the various stages involved in the treatment of sewage water. 6
- c) With the help of a block diagram explain the working of Gas Chromatography. 4
- d) Discuss the various types of Fibre glass reinforced Composites. 4
6. a) Outline the classification of polymers based on : 6
- i) Structure
- ii) Number and arrangements of monomeric units
- iii) Response to heat and pressure.
- b) A sample of water was tested for hardness and Alkalinity. A 10 ml of the sample tested using the standard procedures gave the following observations :
- i) 2.5 ml of 0.1 M EDTA required to achieve the Eriochrome Black T indicator end point.
- ii) 1.5 ml of 0.1 N HCl required to achieve the methyl orange end point. Calculate the Hardness and Alkalinity of the sample in ppm CaCO_3 equivalents. (Given : 1 ml of 0.01 M EDTA = 1 mg CaCO_3 equivalents. Hardness ; 1 ml of 1 M HCl = 50 mg CaCO_3 equivalents. alkalinity.) 6



- c) Outline the principle of UV-Vis Spectroscopy and draw the block diagram of the Spectrophotometer. 4
- d) Outline the various applications of composite materials. 4

PART – C

Answer **any one** question.

- 7. a) Write the Nernst equation for the following electrode system Al/Al^{3+} (0.01M) and determine its electrode potential at 25°C. ($E^\circ \text{Al} = -1.66 \text{ v}$). 5
- b) What is differential aeration corrosion ? Illustrate with an example. 5
- c) Explain the processing of natural rubber and state the drawbacks of natural rubber in comparison to synthetic rubber. 5
- d) Define the term COD. Explain one suitable method for determination of COD of sewage water. 5
- 8. a) Explain the Municipal treatment of raw water for preparing potable water. 5
- b) Explain the working of Hydrogen oxygen fuel cell. 5
- c) State and explain factors affecting rate of corrosion due to nature of metal. 5
- d) Explain the crystalline and amorphous behaviour in polymers with regard to their structures. 5