FACULTY OF ENGINEERING
B.E. (ECE/M/P/AE)/(AI&DS/AI&ML/IoT/IT) II– Semester (AICTE) (Main& Backlog) (New) Examinations, September/October 2023

Subject: Engineering Chemistry/Chemistry

Time: 3 Hours

Max. Marks: 70

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each questions carries 14 Marks.

(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.

(iii) Missing data, if any, may be suitably assumed.

1. (a) Differentiate between primary and secondary batteries.

   (b) The standard emf of Daniel cell is 1.1V. Calculate standard Gibbs energy for the cell reaction: $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$

   (c) What is alkalinity of water? Give the expression to estimate alkalinity of water using phenolphthalein indicator.

   (d) List the methods that are used to prevent corrosion.

   (e) Give an example (with it's structure) of a polymer formed from the monomers through addition polymerisation and condensation polymerisation.

   (f) What is cracking? Explain its significance.

   (g) What is transesterification?

2. (a) (i) Explain how pH of a solution is determined using Quinhydrone electrode.

   (ii) At pH 7, what is the emf of a glass electrode?

   (b) (i) What is a fuel cell?

   (ii) Give the construction and working of methanol-oxygen fuel cell.

3. (a) (i) Distinguish between softening and demineralization of water.

   (ii) An exhaustive zeolite softener was regenerated by passing 200 liters of NaCl solution, having a strength of 200 g/L of NaCl. If the hardness of water is 500 ppm, calculate the total volume of water that has been softened in the softener.

   (b) (i) Discuss the mechanism of electrochemical corrosion.

   (ii) Explain any one surface coating method.

4. (a) (i) Differentiate between thermoplastics and thermosets.

   (ii) Explain the mechanism of addition polymerization.

   (b) (i) Explain preparation, properties and uses of Buna-s rubber

   (ii) What are biodegradable polymers? Give an example along with its structure and explain its properties and applications.

5. (a) (i) Classify fuels and give expressions for HCV and LCV

   (ii) On burning 1.0g of a solid fuel in a bomb calorimeter, the temperature of 5kg of water raised through 5°C. Calculate HCV (Water equivalent of calorimeter is 385 cal/g).

   (b) (i) Explain the two different methods used to analyze coal.

   (ii) What is fractionation of petroleum? Explain.