FACULTY OF ENGINEERING
B.E. (CSE/CME/EEE) I - Semester (AICTE) (Main) (New) Examination, February/ March 2025

Subject: Engg. Chemistry

Time: 3 Hours   Max. Marks: 70

Note: (i) First question is compulsory and answer any four questions from the
remaining six questions. Each question 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) Sketch the glass electrode and write its cell notation.
   b) What cell is used in inverters? Write the cell reactions.
   c) Mention four important specifications for potable water.
   d) Explain the difference between Buna-S and Buna-N rubbers.
   e) What is the significance of carbon neutrality?
   f) Aniline exhibits hypsochromic shift in acidic medium. Why?
   g) What are LPG and CNG? Give their compositions.

2. a) Derive Nernst equation. From the following Cell:
   $Zn(s)| Zn^{2+}(aq, 1.0 M) || H^+(aq, ? M)| H_2(g, 1.0 atm)|Pt(s)$, calculate the pH of the solution in the
   second compartment if the measured potential in the cell is 0.26 V at 25°C and the pressure of
   hydrogen gas is 1.0 atm.
   b) Describe the working principle of methanol-oxygen fuel cell and its applications.

3. a) Discuss the mechanism of electrochemical corrosion and explain how it can be prevented by
   surface coating methods.
   b) Explain about (i) Water softening by ion exchange process and (ii) Reverse Osmosis

4. a) Write the differences between (i) Addition and Condensation Polymerization
                                    (ii) Thermosets and Thermoplasts
   b) Define biomaterials. Explain the preparation and applications of polylactic acid.

5. a) (i) What are the requirements of a good fuel?
      (ii) Using Dulong's formula, calculate the HCV and LCV of a fuel, given its composition as C = 78%;
      H_2 = 8%; O_2 = 4%; S = 2%; ash = 8%.
   b) (i) Discuss about the composition and uses of various liquid fuels.
      (ii) What is knocking and how can it be eliminated?

6. a) Explain the principle of ^1H NMR spectroscopy and the significance of chemical shift.
   b) Discuss the principles of green chemistry with examples.

   a) Classify conducting polymers and discuss their properties.
   b) (i) Give a brief note on biodiesel.
      (ii) Explain the basic principle of IR spectroscopy and mention any two of its applications.

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