Roll No:

B TECH
(SEM-I) THEORY EXAMINATION 2020-21
ENGINEERING CHEMISTRY

Time:3 Hours   *Total Marks:70*
Note: Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION - A

1.   **Attempt *all* questions in brief.**   **2 x 7 = 14**
      (a) Write the chemical composition of Portland cement.
      (b) Explain why Teflon is highly chemical resistant?
      (c) Write the formula for Wilkinson's catalyst and Zeise's salt.
      (d) How many NMR signals are found in $CH_3CHOHCH_2CH_3$?
      (e) Explain Meta stable equilibrium of one component system.
      (f) how must rust ($F_2O_3.3H_2O$) will be formed when 100 kg of iron have rusted away?
      (h) Arrange the following molecules/ions in order of their increasing bond length: N_2, N_2^-, N_2^+

SECTION – B

2.   **Attempt any *three* of the following:**   **7 x 3 = 21**
      (a) Explain thick layer lubrication and thin layer lubrication.
      (b) What are batteries? Write the cell reaction of lead storage battery when it is in use an recharging.
      (c) Explain why KCl-NaCl- H_2O should be regarded as a three-component system whereas KCl-NaBr-H_2O should be regarded as a four-component system.
      (d) A zeolite softener was exhausted, when 10,000 L hand water was passed through it. The softener required 200 L of NaCl solution of strength 50g/L. Calculate the hardness of water?
      (e) (i) What is finger region? Two isomers A and B of the molecular formula C_3H_6O gives an IR a 1650 cm^{-1} and 1710 cm^{-1} respectively. Assign structural formula to A and B isomer.
          (ii) What is meant by calorific value of a fuel? what is the difference between gross calorific value and net calorific value?
      (f) (i) what are the organo-metallic compounds? Give the preparation and five applications of Grignard reagent.
          (ii) Give suitable examples distinguish between chain growth and step growth polymerization process.

SECTION – C

3.   **Attempt any *one* part of the following:**   **7 x 1 = 7**
      (a) Draw a neat, labeled phase diagram of water system and explain the areas and curves in it. What is the significance of the triple point in this system?
      (b) What is liquid Crystal? Distinguish between nematic and semectic liquid crystal and give its applications.

4.   **Attempt any *one* part of the following:**   **7 x 1 = 7**
      (a) What is shielding and de shielding? XY_2 bent molecule show various types of stretching and bending in IR spectroscopy.

      (b) Write a note on conducting polymers.

5.   **Attempt any *one* part of the following:**   **7 x 1 = 7**
      (a) What is crystal imperfection? Explain the one-dimensional imperfection.

      (b) What is Portland cement? Give chemical reactions involved during setting and hardening of cement.

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6.   **Attempt any *one* part of the following:**   **7 x 1 = 7**
        (a) What is electrochemical corrosion? Write down the mechanism involved in electrochemical corrosion.

         (b) What is hardness of water? Describe ion exchange process for making soft water from hard water.

7.   **Attempt any *one* part of the following:**   **7 x 1 = 7**
        (a) Calculate the amount of lime (90% pure) and soda (98% pure) for the treatment of 10^6 liters of   water containing: Ca (HCO3) = 8.1 ppm, CaCl2=33.3 ppm HCO3 = 91.5ppm. Mg (HCO3) =14.6 ppm. And MgCl2 = 38 ppm.The coagulant $Al_2(SO_4)_3$ was added at the rate of 17.1mg/L.

        (b) Explain sacrificial anodic and impressed current cathodic protection method for protection of corrosion.