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**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  $\text{CH}_3\text{CHOHCH}_2\text{CH}_3$ ?
- (e) Explain Meta stable equilibrium of one component system.
- (f) how much rust ( $\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ ) will be formed when 100 kg of iron have rusted away?
- (h) Arrange the following molecules/ions in order of their increasing bond length:  $\text{N}_2$ ,  $\text{N}_2^-$ ,  $\text{N}_2^+$

**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  $\text{KCl-NaCl-H}_2\text{O}$  should be regarded as a three-component system whereas  $\text{KCl-NaBr-H}_2\text{O}$  should be regarded as a four-component system.
- (d) A zeolite softener was exhausted, when 10,000 L hard water was passed through it. The softener required 200 L of  $\text{NaCl}$  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  $\text{C}_3\text{H}_6\text{O}$  gives an IR a  $1650\text{ cm}^{-1}$  and  $1710\text{ cm}^{-1}$  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 smectic 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?  $\text{XY}_2$  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 (HCO<sub>3</sub>) = 8.1 ppm, CaCl<sub>2</sub> = 33.3 ppm HCO<sub>3</sub> = 91.5 ppm. Mg (HCO<sub>3</sub>) = 14.6 ppm. And MgCl<sub>2</sub> = 38 ppm. The coagulant Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> was added at the rate of 17.1 mg/L.
- (b) Explain sacrificial anodic and impressed current cathodic protection method for protection of corrosion.

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