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**BTECH**  
**(SEM I) THEORY EXAMINATION 2021-22**  
**ENGINEERING CHEMISTRY**

**Time: 3 Hours****Total Marks: 70****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**

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| a. | Illustrate any two applications of Nanotechnology.                                     |
| b. | Define Metal excess defect with example.   |
| c. | Justify simple molecule do not polymerized?  |
| d. | What is chemical Formula of Plaster of Paris?  |
| e. | What are Auxochrome? Give example.   |
| f. | Why hardness is expressed in terms of CaCO <sub>3</sub> equivalents.                   |
| g. | How many NMR Signal is Obtained in CH <sub>3</sub> COCH <sub>2</sub> CH <sub>3</sub> ? |

**SECTION B****2. Attempt any three of the following:****7 x 3 = 21**

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| a. | Draw the Molecular Orbital diagram of N <sub>2</sub> molecule. Calculate its bond order and predict their magnetic behavior. |
| b. | Illustrate the preparation of Organometallic compounds with their applications.  |
| c. | Explain setting and hardening of cement with relevant chemical reactions involved.   |
| d. | Illustrate Ion exchange process for the purification of hard water?  |
| e. | Discuss the electronic transition and shifts in UV –Visible Spectroscopy.  |

**SECTION C****3. Attempt any one part of the following:****7 x 1 = 7**

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| a. | Discuss stoichiometric and non-stoichiometric defects? Explain Frenkel and Schottky defects found in solids.                        |
| b. | Illustrate the concept of Liquid crystals? Classify them on the basis of temperature and mention four important applications of it. |

**4. Attempt any one part of the following:****7 x 1 = 7**

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| a. | Give the preparation, properties and applications of the Nylon 6,6 and Buna – S. |
| b. | Illustrate the conducting polymers with its classification and application.      |

**5. Attempt any one part of the following:****7 x 1 = 7**

|    |   |
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| a. | Discuss the electrochemical theory of corrosion. How it can be prevented. |
| b. | Derive Nernst equation and give its applications.                         |

**6. Attempt any one part of the following:****7 x 1 = 7**

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| a. | Calculate the quantity of lime (85% pure) and soda (90% pure) for softening 100000 liters of water. Water sample containing following salts on analysis: CaCl <sub>2</sub> = 111 mg, MgSO <sub>4</sub> = 30 mg, Mg (HCO <sub>3</sub> ) <sub>2</sub> = 36.5 mg. and FeSO <sub>4</sub> .7H <sub>2</sub> O = 73 mg. |
| b. | Illustrate the salient features of the phase diagram of Water system highlighting the name of system (areas, curves and points), phase in equilibrium and degree of freedom in each case.  |

**7. Attempt any one part of the following:****7 x 1 = 7**

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| a. | Illustrate with the help of a neat diagram, how calorific value is determined by bomb calorimeter. |
| b. | Outline finger print region and the different types of molecular vibrations in IR spectroscopy.    |