

**JK Lakshmipat University Jaipur**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

End Term Examination, December 2015  
B. Tech. I year, I Semester CH-101 (CSE, ECE & EE)

Roll No.....

CH101: ENGINEERING CHEMISTRY

Time: 3.00 hours

Max. Marks: 100

**Instructions to students:**

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

**Q.1 Objective type ( 1 marks each)**

10

- i. What is the formula to convert hardness into equivalent of  $\text{CaCO}_3$ .
- ii. Write name and formula of four salts responsible for permanent hardness.
- iii. Write the formula of Gypsum and its role in cement.
- iv. Give the formula of any two Coagulants.
- v. Write the name and formula of Nylon 6:6 monomers.
- vi. Write the chemical name of  $\text{C}_3\text{A}$  for cement manufacturing.
- vii. Write the formula to calculate viscosity index of a lubricant
- viii. Write the relation in radius and edge length for FCC and BCC unit cell.
- ix. Define Thermoplastic polymer.
- x. Give the structure of Ethylene Di amine Tetra Acetic acid.

**Q.2 Short answer type questions (2.5 marks each)**

10

- i. What is Hardness? Define Scale and Sludge in boilers.
- ii. Give the classification of Polymers on the basis of types of monomer used.
- iii. Define the Cloud and Pore point for a lubricant.
- iv. X-ray of wavelength  $1.54 \text{ \AA}$  strike at an angle  $22.5^\circ$  on a crystal plane, assuming that  $n = 1$ , Calculate the spacing between two parallel planes?

Q.3A Define the co-polymerization taking suitable examples.

5

Q.3B What is Lubricant? Explain the mechanism of Boundary Lubrication.

5

Q.4A The hardness of  $10,000 \text{ L}$  of a sample of water was removed by Zeolite process. The softener then required  $400 \text{ L}$  of  $\text{NaCl}$  of strength  $100 \text{ gm/L}$  for regeneration. Calculate the hardness of water sample in ppm.

5

Q.4B Write short notes on

5

(i) PASSIVITY

(ii) Galvanic corrosion with example

- Q.5A The density of face - centered cubic element (atomic mass = 60.2) is 6.20 gm/cm<sup>3</sup>. Calculate the length of the edge and radius of the unit cell. ( $N_A = 6.023 \times 10^{23}$ ) 5
- Q.5B How the hardness of water is removed by Zeolite process explain with reactions? 5

- Q.6A Give chemical reactions taking place in different zones of rotary kiln during the cement manufacturing. 5
- Q.6B Derive the Bragg's equation to calculate the distance between two parallel planes in a crystal. 5

- Q.7A Explain the structural features and application of FULLERENE. 5
- Q.7B Explain the setting and hardening of Portland cement with reactions? 5

OR

- Q.7B Calculate the Temporary and Permanent and Total hardness of a sample of water in ppm and in °Fr. This water sample on analysis gives following impurities: 5

| Impurity        | Ca(HCO <sub>3</sub> ) <sub>2</sub> | Mg(HCO <sub>3</sub> ) <sub>2</sub> | MgSO <sub>4</sub> | CaSO <sub>4</sub> | CaCl <sub>2</sub> |
|-----------------|------------------------------------|------------------------------------|-------------------|-------------------|-------------------|
| Quantity (mg/L) | 4.0                                | 6.0                                | 10                | 8.0               | 8.2               |
| Mol.Wt.         | 162                                | 146                                | 120               | 136               | 111               |

- Q.8 Give the preparations and properties of following polymer. 10
- (i) TEFLON (ii) PMMA (iii) PAN (iv) Nylon 6:10 (v) SBR

OR

- Q.8 Define Flash and Fire point for a lubricant, how these points are determined by Pensky marten's apparatus. 10

- Q.9 Give the mechanism of electrochemical corrosion taking iron as example 10
- (a) By Hydrogen evolution (b) By absorption of Oxygen

OR

- Q.9 Define Carbon Nano Tubes (CNT)? Give the types of CNTs and their applications. 10

- Q.10 0.5 gm of CaCO<sub>3</sub> was dissolved in HCl and the solution made up to 500 ml with distilled water. 50 ml of this standard hard water solution required 48 ml of EDTA solution for titration. 50 ml of a hard water sample required 15 ml of EDTA and after boiling it required 10 ml of EDTA solution. Calculate the total, temporary and permanent hardness present in water sample. 10