

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Backlog)
B. Tech. I Year

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. 1 ppm = ...mg/l = ... $^{\circ}\text{Fr}$ = ... $^{\circ}\text{Cl}$.
- ii. Define the term Functionality and Degree of polymerization.
- iii. Write the ions responsible for Alkalinity in water.
- iv. Write the formula of Viscosity Index of a Lubricant.
- v. Give the structure of Ethylene Di amine Tetra Acetic acid.
- vi. Explain the role of Gypsum in cement.
- vii. Give the name and structure of monomer of Natural Rubber.
- viii. Write the types of copolymers?
- ix. Write the chemical name of C_4AF .
- x. Write the relations between atomic radius and edge length for SCC, FCC and BCC crystal.

Q.2 Short answer type questions (2.5 marks each) 10

- i. Give the classification of polymers on the basis of Structure.
- ii. What is Hardness? Why hard water consumes a lot of soap, explain with chemical reactions.
- iii. Define the Flash and fire point for a lubricant.
- iv. Drive the relations between Atomic radius and edge length for a BCC unit cell?

Q.3A What is Lubricant? Explain thick film mechanism of Lubrication. 5

Q.3B An exhausted Zeolite softener was regenerated by passing 150 liters of NaCl solution, having strength 150gm/L of NaCl. If the hardness of water is 600 ppm, calculate the total volume of water that is softened by this softener. 5

Q.4A What is Elastomer? Explain the Vulcanization of raw rubber with reaction. 5

Q.4B Write the Chemical Reactions take place during Lime Soda Process. 5

- Q.5A Derive the Bragg's equation to calculate the separation between two parallel planes of a crystal? 5
- Q.5B Explain the setting and hardening of cement with reactions. 5

- Q.6A A crystal has FCC structure; its density is **2.18 gm/cm³**. Calculate the distance between two adjacent atoms? (Given **M = 58.5** and **N_A = 6.023 × 10²³**) 5

- Q.6B Write short notes on (i) PASSIVITY and (ii) Galvanizing process 5

- Q.7A What is Fullerenes? Explain the structural features and application of fullerene. 5

- Q.7B Give the structural properties and types of Carbon Nano Tubes (CNT). 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:

Impurity	Ca(HCO ₃) ₂	Mg(HCO ₃) ₂	MgSO ₄	CaSO ₄	CaCl ₂
Quantity (mg/L)	10.5	12.5	2.6	7.5	8.2
Mol.Wt.	162	146	120	136	111

- Q.8 Give the mechanism of electrochemical corrosion taking iron as example 10
(a) By Hydrogen evolution (b) By absorption of Oxygen

OR

- Q.8 Discuss the significance of viscosity in lubricating oil. How the viscosity is determined by Red-wood viscometer? 10

- Q.9 What is Cement? Give chemical reactions taking place in different zones of rotary kiln process in cement manufacturing. 10

OR

- Q.9 Give the preparations and properties of following polymer. 10
(i) Polystyrene (ii) PMMA (iii) PVC (iv) Nylon 6:6 (v) SBR

- Q.10 A standard hard water contains **15 gm CaCO₃** per liter. **20 ml** of this required **25 ml** of EDTA solution. **100 ml** of water sample required **18 ml** of same EDTA solution up to end point. The same sample after boiling required **12 ml** of EDTA solution. Calculate the Temporary and Permanent hardness of water sample. 10