

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, November 2016

B. Tech. I year, I Semester CH-101 (CHE, CE, ME, CSE - IBM CC, MC)

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. Give the structure of Ethylene Di amine Tetra Acetic acid (EDTA).
- ii. Write name and formula of any four salts responsible for permanent hardness.
- iii. What is the formula to convert hardness into equivalent of CaCO_3 .
- iv. Give the formula of any two Coagulants used in LS process of softening.
- v. Write the name and formula of Nylon 6:10 monomers.
- vi. Write the chemical name of C_4AF .
- 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. Give the formula of CALGON.
- x. Write the Bragg's equation.

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

- i. Write the formula of Gypsum and its role in setting of cement with equation.
- 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. The X-ray of wavelength $1.54 \text{ \AA}$ is falling at an angle $14^\circ 12'$ shows first order reflection. Calculate the separation between two parallel planes of crystal.

Q.3A Define the co-polymerization taking suitable examples. 5

Q.3B What is Lubricant? Explain the mechanism of Thick film lubrication. 5

Q.4A The hardness of 10,000 L of a sample of water was removed by Zeolite process. The softener then required 400 L of NaCl of strength 150 gm/L for regeneration. Calculate the hardness of water sample in ppm. 5

Q.4B Write short notes on 5
(i) Pilling Bedworth rule (ii) Pitting Corrosion

- Q.5A The density of face - centered cubic element (atomic mass = 60.2) is 6.20 gm/cm^3 . 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 Explain the structural features and application of FULLERENE with figure. 5
- Q.6B Give chemical reactions taking place in different zones of rotary kiln during the cement manufacturing. 5

- Q.7A Explain the setting and hardening of Portland cement with reactions? 5
- Q.7B What is Liquid crystal? Give the classification of liquid crystals. 5

OR

- Q.7B Calculate the Temporary and Permanent and Total hardness of a sample of water in ppm and in $^\circ\text{Fr}$. This water sample on analysis gives following impurities: 5

Impurity	$\text{Ca}(\text{HCO}_3)_2$	$\text{Mg}(\text{HCO}_3)_2$	MgSO_4	CaSO_4	CaCl_2
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) Bakelite (ii) PMMA (iii) PAN (iv) Nylon 6 (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_3 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