

JK Lakshmi Pat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Special Examination 2016

B. Tech. I year, I Semester CH-101

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.	Write the Bragg's equation.	
ii.	1 ppm = ...mg/l = ... °Fr = ... °Cl .	
iii.	Give the structure of monomer of Teflon.	
iv.	Write the formula to calculate Viscosity Index of a Lubricant.	
v.	Write the chemical name of C ₄ AF.	
vi.	Write the formula to convert hardness into equivalent of CaCO ₃ .	
vii.	Give the structure of Buna-S	
viii.	Write the ions responsible for Alkalinity in water.	
ix.	What is rust? Give chemical formula.	
x.	Give the structure of Ethylene Di amine Tetra Acetic acid.	
Q.2	Short answer type questions (2.5 marks each)	10
i.	The X-ray of wavelength 1.54 Å is falling at an angle 14°12' shows first order reflection. Calculate the separation between two parallel planes of crystal.	
ii.	Give the classification of polymers on the basis of Structure.	
iii.	Define the Flash and fire point for a lubricant.	
iv.	What is Hardness? Why hard water consumes a lot of soap, explain with chemical reactions.	
Q.3A	What is Lubricant? Explain any one type of mechanism of Lubrication.	5
Q.3B	Define SCALE and SLUDGE formation in Boilers.	5
Q.4A	An exhausted Zeolite softener was regenerated by passing 150 liters of NaCl solution, having strength 125gm/L of NaCl. If the hardness of water is 500 ppm, calculate the total volume of water that is softened by this softener.	5
Q.4B	Give the significance of viscosity in lubricating oil. How the viscosity is determined by Red-wood viscometer?	5

Q.5A	Give chemical reactions taking place in different zones of rotary kiln during the cement manufacturing.	5																		
Q.5B	Explain the Zeolite process of water softening with reactions and figure.	5																		
Q.6A	Copper has an FCC structure and an atomic radius of $1.278 \text{ \AA}$. Calculate its density. Given atomic mass of Cu is 63.5 gm/mol and $N_A = 6.023 \times 10^{23}$.	5																		
Q.6B	What is Fullerenes? Explain the structural features and application of fullerene.	5																		
Q.7A	Write short notes on Cloud point and pour point, steam emulsification number.	5																		
Q.7B	What is Carbon Nano Tubes (CNT)? Give the types of CNTs and their applications.	5																		
	OR																			
Q.7B	Write a detail note on Setting and Hardening of Portland Cement with all reactions.	5																		
Q.8	Give the mechanism of electrochemical corrosion taking iron as example (a) By Hydrogen evolution (b) By absorption of Oxygen	10																		
	OR																			
Q.8	Give the preparations and properties of following polymer. (i) Polystyrene (ii) PMMA (iii) PVC (iv) Nylon 6:6 (v) SBR	10																		
Q.9	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: <table border="1"><tr><td>Impurity</td><td>$\text{Ca}(\text{HCO}_3)_2$</td><td>$\text{Mg}(\text{HCO}_3)_2$</td><td>$\text{MgSO}_4$</td><td>$\text{CaSO}_4$</td><td>$\text{CaCl}_2$</td></tr><tr><td>Quantity (mg/L)</td><td>10.5</td><td>12.5</td><td>2.6</td><td>7.5</td><td>8.2</td></tr><tr><td>Mol.Wt.</td><td>162</td><td>146</td><td>120</td><td>136</td><td>111</td></tr></table>	Impurity	$\text{Ca}(\text{HCO}_3)_2$	$\text{Mg}(\text{HCO}_3)_2$	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	10
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Q.9	What is liquid crystalline state? Give the classification and application of liquid crystals.	10																		
Q.10	A standard hard water contains 15 gm CaCO_3 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																		