Time: 2 Hours **Marks: 60**

N. B.

1. **Question** number **1** is **compulsory**.
2. Attempt **any three** questions from **Q.2 to Q.6.**
3. Draw neat diagrams and write chemical equations where necessary.
4. Figures to right indicate full marks.

Atomic Weight: H=1, C=12, O=16, Ca=40, Na=23, Mg=24, S=32, Cl=35.5, N=14, Al=27, K=39

1. Solve any five.

(a) Explain the principle of EDTA method. 3

(b) What is glass transition temperature. Write its significance. 3

(c) Write the significance of the following properties of lubricants: 3
i) Emulsification ii) Cloud point iii) Fire point

(d) What is RCC? What are the advantages of RCC over concrete? 3

(e) Explain the reduced phase rule. 3

(f) Distinguish between thermoplastic and thermosetting polymer. 3

(g) 20 ml sample of waste water was refluxed with 30 ml of potassium dichromate solution and after refluxing the excess unreacted dichromate required 11 ml of 0.1 N FAS solution. Blank of 20 ml of distilled water on refluxing with 30 ml of dichromate solution required 14 ml of 0.1 N FAS solution. Calculate the COD value of wastewater. 3

2. (a) A sample of water contains following impurities: 6

$Mg(HCO_3)_2$=73mg/lit, $MgSO_4$= 120 mg/lit, $CaCl_2$=222 mg/l and Ca $(NO_3)_2$=164 mg/lit.The purity of lime is 74% and soda is 90%.Calculate the quantity of lime and soda needed for softening of 50,000 litres of water.

(b) i) Write a brief note on polymers used in medical field. 3
ii) Name two additives added in blended oils. Give one example of each. 2

(c) Explain with the help of chemical reactions " Setting and Hardening " of cement. 4

3.(a) What is fabrication of plastic? Explain injection moulding process with a neat diagram. 6

(b) i)Discuss the advantages and limitations of phase rule. 3
ii)Differentiate between SWNT and MWNT 2

(c)	A zeolite softener was completely exhausted and was regenerated by passing 1000 litres of NaCl solution, containing 100mg/lit of NaCl. How many litres of a sample water of hardness 500ppm can be softened by this softener?	4
4. (a)	Draw the diagram for demineralization process and write suitable reactions involved in the process. What are the advantages and disadvantages of the method.	6
(b)	i) Find the acid value of the given oil whose 20ml required 2.8ml of N/10 KOH during titration. (Density of oil = 0.86g/ml)	3
	ii)Write a short note on decay of concrete.	2
(c)	Natural rubber requires vulcanization. Give reasons. With appropriate reactions explain how the drawbacks are overcome?	4
5. (a)	Write preparation, properties and uses of following polymers: (Any two) i) Kevlar ii) Silicone rubber iii) Buna S	6
(b)	i) Explain Activated sludge method with the help of diagram.	3
	ii) What is grease? What are the conditions in which greases are used?	2
(c)	Draw the phase diagram of one component system and find out the number of degree of freedom along the curves and areas.	4
6. (a)	What are lubricants? Define Lubrication. Explain Hydrodynamic lubrication mechanism with neat diagram.	6
(b)	i) Define a) Phase b) Component c) Degree of freedom	3
	ii) Write a short note on Reverse Osmosis.	2
(c)	Explain laser ablation method for production of CNTs.	4
