

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.

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|--------|--|--------|
| (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:
i) Emulsification ii) Cloud point iii) Fire point | 3 |
| (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:

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. | 6 |
| (b) | i) Write a brief note on polymers used in medical field.
ii) Name two additives added in blended oils. Give one example of each. | 3
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.
ii) Differentiate between SWNT and MWNT | 3
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) 6
 i) Kevlar ii) Silicone rubber iii) Buna S
- (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