

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
- $\text{Mg}(\text{HCO}_3)_2 = 73 \text{ mg/lit}$ ,  $\text{MgSO}_4 = 120 \text{ mg/lit}$ ,  $\text{CaCl}_2 = 222 \text{ mg/l}$  and  $\text{Ca}(\text{NO}_3)_2 = 164 \text{ mg/lit}$ . 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) 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