

(2 Hours)

(Total Marks : 60)

Please check whether you have got the right question paper.

- N.B.:**
- 1) Question No. 1 is compulsory.
 - 2) Answer **any three** questions from remaining **five** questions.
 - 3) **Figures** to the **right** indicate **full marks**.
 - 4) **Atomic weight :**

Ca = 40, Mg = 24, H = 1, C = 12, O = 16, Cl = 35.5, S = 32, N = 14.

1. Attempt **any five** from the following :

(15)

- a) Give the preparation, properties and uses of PMMA.
- b) Why COD is greater than BOD?
- c) Define Viscosity Index and give its significance in lubrication.
- d) Find out degree of freedom for the following equation :
 - i) $\text{CaCO}_{3(s)} \rightleftharpoons \text{CaO}_{(s)} + \text{CO}_{2(g)}$
 - ii) $\text{NH}_4\text{Cl}_{(s)} \rightleftharpoons \text{NH}_{3(g)} + \text{HCl}_{(g)}$
- e) Write a note on concrete.
- f) Define fabrication. Draw labelled diagram for injection moulding.
- g) Calculate temporary and permanent hardness of water sample containing following impurities; $\text{CaSO}_4 = 13.6\text{ppm}$, $\text{MgCl}_2 = 9.5\text{ppm}$, $\text{MgSO}_4 = 6.0\text{ppm}$, $\text{CaCl}_2 = 11.1\text{ppm}$.

2. a) A water sample on analysis gave the following data :

(06)

$\text{MgSO}_4 = 8.4\text{ppm}$, $\text{Mg}(\text{HCO}_3)_2 = 173.4$, $\text{CO}_2 = 300\text{ppm}$, $\text{MgCl}_2 = 95\text{ppm}$,
 $\text{Mg}(\text{NO}_3)_2 = 26.9\text{ppm}$. Calculate the lime (80% pure) and soda (85% pure)
 requirement in Kg for softening of 30,000 liters of water.

b) What is reduced phase rule? Explain two-component lead-silver system with neat and labeled phase diagram. (05)

c) Write a short note on laser method used in manufacturing of CNT. (04)

3. a) Define Lubricant. Explain thin film lubrication in detail. (06)

b) What is vulcanization? How it help to remove drawback of natural rubber? (05)

c) Define triple point. Explain with example. (04)

4. a) Explain the role of each constituent in compounding of plastics. (06)
- b) Explain following : (05)
 - i) Chlorine treatment method for municipal water
 - ii) Reverse osmosis.
- c) 20 ml of lubricating oil required 2.5 ml of 0.1N KOH for titration. Calculate acid value of a lubricating oil. (Density of oil = 0.81 gm/ml). From acid value state whether the oil is useful for lubrication or not. (04)

5. a) Define Portland cement. Name the raw materials and give composition of Portland cement. (06)
- b) Write a note on conducting polymer. (05)
- c) An zeolite softener was completely exhausted and was regenerated by passing 8 liters of NaCl solution having strength 150g/L. If hardness of water is 170 ppm, then calculate total volume that can be softened by zeolite softener. (04)

6. a) What is Activated sludge process? Explain activated sludge process in detail. (06)
- b) Give preparation and uses of Kevlar and Urea formaldehyde resin. (05)
- c) Explain following properties of lubricant with their significance (**any two**) : (04)
 - i) Oiliness
 - ii) Saponification Value
 - iii) Cloud point and Pour point.