

Con. 2888-10.

AN-9766

(2 Hours)

[Total Marks : 75

N.B. (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** questions from remaining **six**.

(3) **Figures** to the **right** indicate **full marks**.

(4) Assume **suitable** data if **necessary**.

(5) At. wts — H = 1, C = 12, O = 16, Ca = 40, Mg = 24, Cl = 35.5, S = 32, Na = 23.

1. Answer any **five** : 15
 - (a) Explain condensation polymerisation with suitable examples.
 - (b) Find acid value of given oil whose 20 ml required $2.8 \text{ ml of } \frac{N}{10} \text{ KOH}$ during titration (density of oil = 0.86 gm/ml) state whether oil is proper for lubrication or not from acid value.
 - (c) Write a short note on the potential of hydrogen as a fuel.
 - (d) Explain the terms : (i) Degree of freedom (ii) Component.
 - (e) Write a short note on—Häckelites.
 - (f) What is the effect of the following alloying elements on the properties of steels—
(i) Chromium (ii) Nickel (iii) Manganese.
 - (g) Write a short note on Reverse osmosis membrane.

2. (a) Give synthesis properties and uses of— 5
 - (i) PMMA (ii) Urea formaldehyde.
- (b) What is the principle of lubrication ? Explain mechanism of Boundary lubrication. 5
- (c) Explain the process of biogas production from biowaste. 5

3. (a) Calculate the amount of lime (85% pure) and soda (95% pure) required to soften one million litre of water which contains $\text{CaCO}_3 = 12.5 \text{ ppm}$, $\text{MgCO}_3 = 8.4 \text{ ppm}$, $\text{CaCl}_2 = 22.2 \text{ ppm}$, $\text{MgCl}_2 = 9.5 \text{ ppm}$, $\text{CO}_2 = 33.0 \text{ ppm}$, $\text{HCl} = 7.3 \text{ ppm}$, $\text{NaHCO}_3 = 16.8 \text{ ppm}$. 5
- (b) (i) Define conducting polymer. Explain how polymers are made conductors with suitable examples. 5
(ii) Write a note on glass transition phenomena.
- (c) What is fabrication ? Explain any two methods of fabrication of plastics in detail. 5

4. (a) How is activated sludge process carried out for the treatment of waste water ? Explain with flow sheet diagram. 5
- (b) Give in brief the functions of various additives employed for the improvement of lubricants. 5
- (c) A zeolite softener was completely exhausted and was regenerated by passing 100 litres of sodium chloride solution containing 120 gm per litre of NaCl. How many litres of sample of water of hardness 500 ppm can be softened by this softener ? 5

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5. (a) Explain the principle and working of a photovoltaic cell with neat labelled diagram. 5
- (b) Describe the demineralisation process. State its advantages and disadvantages. 5
- (c) What is phase rule ? Discuss in brief Lead-silver equilibrium with diagram. 5
6. (a) (i) Explain shape memory effect and give its applications. 5
- (ii) Give the classification of plain carbon steels. What are the drawbacks of plain carbon steel ?
- (b) What are nanowires ? Describe its structure and applications. 5
- (c) Describe laser method for production of carbon nanotubes. Write applications of carbon nanotubes. 5
7. Write short notes on (any **three**) :— 15
- (a) Advanced polymer material
- (b) Liquid Lubricants
- (c) Rechargeable Nickel-Hydrogen batteries
- (d) One component system-water
- (e) Application of nanotechnology in electronics and mechanics.