

N.B:- Question No. 1 is compulsory.

Solve any four questions from remaining questions.

Figures to right indicate full marks.

All questions carry equal marks.

(At-wt Ca=40, H=1, C=12, S = 32, O= 16, Si = 28, Cl=35.5, Mg= 24, Na =23)

Q.1. Solve any five [15]

- Give brief account of reverse osmosis.
- Distinguish between addition polymerisation and condensation polymerisation.
- What is grease? Under which situation it is used as a lubricant.
- What are plain carbon steels? How can they be classified on the basis of carbon content.
- What are fullerenes? State their uses.
- Distinguish between conventional and non conventional energy sources.
- 1.50 gm of an oil was saponified with 50 ml of 0.1 N KOH solution. After refluxing the mixture required 7.5 ml of 0.1 N HCl for neutralization. Find saponification value of oil.

Q.2. (a) Calculate the amount of lime (85% pure) and soda (90% pure) required for softening of 10,000 litres of boiler feed water containing following impurities. [6]

Ca(HCO₃)₂ – 16.2 ppm MgSO₄ – 6.0 ppm CaSO₄ - 6.8 ppm

Mg(HCO₃)₂ – 8.4 ppm CaCl₂ – 11.1 ppm SiO₂ – 8.0 ppm

(b) What are the main constituents of plastic? Write the functions and examples of each constituent. [5]

(c) Rechargeable Nickel – Hydrogen batteries. [4]

[TURN OVER

- Q.3 (a) What is meant by fabrication of plastic ? Name different methods of fabrication.
Explain transfer Moulding with the help of a neat diagram. [6]
- (b) Give in brief the functions of various additives employed for the improvement of lubricants. [5]
- (c) Describe the laser method for production of Carbon Nanotubes. State the applications of Carbon Nanotubes. [4]
- Q. 4. (a) Explain any two of the following properties of lubricants:- [6]
(i) Oiliness (ii) Cloud point and Pour point (iii) Acid Value.
- (b) What is condensed phase rule equation & Explain Lead – Silver system with the help of phase diagram. [5]
- (c) The hardness of 25,000 Litres of water was completely removed using zeolite softener. For regeneration of exhausted zeolite bed, 200 Litres of NaCl solution containing 20 gms / ltr NaCl was required. Calculate the hardness of water sample. [4]
- Q.5 (a) State the phase rule. Discuss the application of phase rule to one component water system. [6]
- (b) How is activated sludge process carried out for the treatment of waste water ? Explain with flow- sheet diagram. [5]
- (c) Write a note on conducting polymers. [4]
- Q.6 (a) Explain the application of nanomaterials in medicines and catalysis. [6]
- (b) Define COD and BOD with its significance. [5]
- (c) Write a note on hydrogen as a fuel. [4]
- Q.7 (a) Write the preparation and uses of [6]
(i) Urea formaldehyde (ii) Buna – S – Rubber.
- (b) Explain the theory of lime soda process with reference to the different functions of lime and soda. [5]
- (c) Explain the specific effects of the following metals on the properties of steels. [4]
(i) Cobalt (ii) Molybdenum.