

QP Code : 28521

Total Marks : 75

Duration : 2 hrs

- N.B.** (1) Question no. I is compulsory.
 (2) Attempt any four questions from remaining six.
 (3) Figures to the right indicate full marks.
 (4) Assume suitable data if necessary.

(At.wt: Mg= 24, H=1, C=12, O=16, Ca=40, Cl=35.5, S=32, N=14, Na=23, Al=27, Fe = 56).

1. Attempt any 5.

15

- Explain condensation polymerization with an example.
- Define BOD and COD and give their significance.
- What are solid lubricants? Where are they used?
- Write a note on plain carbon steels.
- How are nanomaterials different from conventional materials?
- Differentiate between conventional and non conventional energy sources.
- Find the acid value of a used oil sample whose 7ml required 3.8ml of N/20 KOH during titration (Density of oil = 0.88). State whether oil is proper for lubrication or not.

2. a)) Calculate lime (90%) and soda (80%) pure required for softening one million litres of water containing following impurities-

- $\text{Mg}(\text{HCO}_3)_2 = 14.6 \text{ mg/litre}$
- $\text{Mg}(\text{NO}_3)_2 = 29.6 \text{ mg/litre}$
- $\text{Ca}(\text{HCO}_3)_2 = 8.1 \text{ mg/litre}$
- $\text{HCl} = 3.65 \text{ mg/litre}$
- $\text{Na}_2\text{SO}_4 = 4.5 \text{ mg/litre}$

6

b) What is compounding of plastics? Give the different additives of plastics with examples.

5

c) Write a note on solar flat plate collector.

4

3. a) Give the preparation, properties and uses of PMMA and Buna-S.

6

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- b) What are blended oils? With examples explain how they are superior to vegetable and mineral oils? 5
- c) What are fullerenes? Explain their structure and applications. 4
4. a) What is the mechanism of lubrication applicable to a journal bearing? Explain with diagram and state the type of lubricant suitable for it. 6
- b) What are special steels? Give the special properties imparted to steels by Cobalt, Manganese, Nickel.
- c) 50ml of standard hard water (2gm CaCO_3 /litre) requires 30ml of EDTA solution. 100ml of a water sample consumes 15ml EDTA. 100ml of boiled and filtered water sample consumes 8ml EDTA solution. Calculate temporary hardness of the given water sample. 4
5. a) Draw the phase diagram of a one component system and derive all possible degrees of freedom. 6
- b) With the help of a flow chart explain activated sludge system of waste water treatment. 5
- c) Explain the process of vulcanization of natural rubber. Compare the properties of the natural and vulcanized rubber. 4
6. a) What are the different methods of synthesizing carbon nanotubes? Explain any one. 6
- b) Describe the demineralization process of water treatment with respect to the following: i) Principle ii) Diagram iii) Process iv) Advantages. 5
- c) Explain the construction and working of photovoltaic cell. 4
7. a) Name the different fabrication techniques for moulding of polymers. Explain injection moulding with a neat diagram. 6
- b) Write a note on any one: i) Reverse osmosis process ii) Permutit process 5
- c) Define and give the significance of the following properties of lubricants: i) Viscosity index ii) Flash point and fire point. 4

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