

QP Code : 1021

( 2 Hours)

[ Total Marks : 75

- N.B. :** (1) Question No. 1 is compulsory.  
 (2) Attempt any **four** questions from remaining six questions.  
 (3) Figures to the right indicates full marks.  
 (4) Atomic weights - Al = 27, Ca = 40, S = 32, Cl = 35.5, Fe = 58.8,  
 K = 39, H = 1, C = 12, N = 14, O = 16, Na = 23, Mg = 24

1. Solve any five

15

- Write the salient features of condensation polymerisation.
- Differentiate between temporary and permanent hardness.
- 6 ml of oil taken out from a gear box required 3.5ml of 0.05N KOH for titration. Find acid value (Density = 0.75gm/ml)
- What are the advantages of solar energy?
- Define phase, component and Degree of freedom.
- What are the functions of lubricants?
- State the structural details of graphite.

2. (a) Calculate the amount of lime (95% pure) and soda (80% pure) required for softening of 20,000 liters of boiler feed water containing following impurities.

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- $\text{Ca}(\text{HCO}_3)_2 = 15.5\text{ppm}$
- $\text{CaSO}_4 = 8.5\text{ppm}$
- $\text{CaCl}_2 = 12.5\text{ppm}$
- $\text{MgSO}_4 = 10.00\text{ppm}$
- $\text{Mg}(\text{HCO}_3)_2 = 15\text{ppm}$
- $\text{SiO}_2 = 8.9\text{ppm}$

(b) What is fabrication of plastics? Explain in detail compression moulding method of fabrication of plastics.

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(c) Write a note on photovoltaic Cell.

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3. (a) Write short notes on - 6  
 i) Compounding of plastics  
 ii) Glass transition temperature  
 (b) What is lubrication? Explain Fluid film lubrication mechanism. 5  
 (c) What are applications of nanomaterials in the field of Environmental 4  
 technology and Medicines.
4. (a) Write definition and significance of following properties of lubricants. 6  
 i) Cloud point and pour point  
 ii) Viscosity and viscosity Index  
 (b) Explain application of Gibb's phase rule to water system. 5  
 (c) 1500 litres of hard water was softened by zeolite softener. After it got exhausted, 4  
 required 50 litres of NaCl containing 110gm per lit. of NaCl for its  
 regeneration. Calculate the hardness of water.
5. (a) What is plain carbon steel? What are the drawbacks of plain carbon steel? 6  
 Explain the classification of plain carbon steel on the basis of carbon content.  
 (b) Explain the demineralization of hard water with neat diagram and appropriate 5  
 reactions.  
 (c) Define Plastics. Write preparation properties and uses of PMMA. 4
6. (a) Describe Laser method for production of carbon nanotubes. Write 6  
 applications of carbon nanotubes.  
 (b) Explain reactions of lime and soda used for softening of hard water. 5  
 (c) Explain how biogas is produced from biomass. 4
7. (a) What are drawbacks of natural rubber? Explain vulcanization process in detail 6  
 to improve the properties of rubber.  
 (b) Explain activated sludge process to control water pollution. 5  
 (c) What are applications and limitations of phase rule? 4