

[Time: 2 Hours]

[Marks:60]

Please check whether you have got the right question paper.

- N.B:**
1. Question No. 1 is compulsory.
 2. **Attempt any three questions from the remaining questions.**
 3. **All questions carry equal marks**
 4. **Atomic weights:**
[Ca= 40, C=12, O=16, H=1, Mg= 24, S=32, Cl= 35.5]



- Q.1** Attempt any **five** of the following:- 15
- a. What are cation and anion exchangers?
 - b. Give the preparation, properties and uses of polymethyl metha acrylate polymer
 - c. A 10ml of sample of waste water was refluxed with 20ml of potassium dichromate solution and after refluxing the excess unreacted dichromate required 36.2 ml of 0.1M FAS solution. A blank of 10ml of distilled water on refluxing with 20ml of dichromate solution required 46ml of 0.1 M FAS solution Calculate the COD Value of the waste water.
 - d. Define
 - (i) Flash point
 - (ii) Oilness
 - (iii) Pour point
 - e. What is Reduced phase rule?
 - f. What are the drawbacks of natural Rubber?
 - g. Explain CVD (chemical vapour deposition) method for production of CNT'S (carbon nano tubes)
- Q.2** a. Calculate the amount of lime (80% pure) and soda (90%) required for softening of 50,000 litres of hard water whose chemical analysis results are given below: 06
 $\text{Ca (HCO}_3)_2 = 40.5 \text{ mg/L}$, $\text{Mg (HCO}_3)_2 = 73.0 \text{ mg/L}$, $\text{MgSO}_4 = 60.0 \text{ mg/L}$, $\text{CaSO}_4 = 34.0 \text{ mg/L}$, $\text{CaCl}_2 = 27.5 \text{ mg/L}$ and $\text{NaCl} = 20.0 \text{ mg/L}$
- b. (i) Write a brief note on conducting polymers 3
(ii) Mention the conditions under which semi-solid lubricants can be used 2
 - c. Explain with the help of chemical reactions 'setting and hardening' process of cement. 4
- Q.3** a. Write a short note on: 6
- (i) Injection moulding method for plastics.
 - (ii) Polymer in medicine and surgery.
- b. (i) Draw and explain the important features of phase diagram of water system. 3
(ii) Mention the Raw materials of Portland cement along with their percentage composition 2
 - c. Ten thousand liters of hard water was made soft with zeolite. The exhausted zeolite required a total amount of 8 litres of NaCl solution containing 150 gm per litre for regeneration. Calculate the hardness of water. 4

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- Q.4 a. Explain Ion- Exchange process for softening of hard water. What are its advantages and dis-advantages. 6
b. (i) 9ml of oil is taken from machine and it requires 1.5 ml of 0.04 N KOH. Find acid value. 3
(density of oil= 0.81g/ml)
(ii) Write a note on Decay of concrete. 2
c. What are the additives mixed with plastics for its compounding? Explain their functions. 4
- Q.5 a. (i) Distinguish between Thermo- plastic and Thermosetting plastic. 6
(ii) Write a note on Visco- elastic state.
b. (i) Write a note on Ultra-filtration method for purification of water 3
(ii) Give the important functions of Lubricant. 2
c. What is the mathematical form of the Gibb's phase rule equation? Explain the meaning of each one of the terms involved in it. 4
- Q.6 a. What is Lubrication? Explain the mechanism of fluid film Lubrication 6
b. (i) What is meant by Triple point? Apply phase rule and find degree of freedom for Triple point. 3
(ii) Distinguish between temporary and permanent hardness of water. 2
c. Describe the wet process for manufacture of Portland cement. 4