

Total No. of Questions:-4
Class Roll No.

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Enrollment No

LNCTU BHOPAL

AL-101

Mid-Semester Examination-I (May 2025)

B.Tech. I Semester (AIML)

Engineering Chemistry & Life Science

Duration: 1hr 30min

Max. Marks: 20

Note: Attempt all questions.

Q1.a) Define Carbonate and Non-Carbonate Hardness of water. Discuss any 4 units of hardness and relationship between them.

b) Interpret the type and extent of hardness in degree French if 1000 mg of CaCO_3 dissolved in dil HCl and volume make up to 1L. 100 ml of this sample require 50ml of EDTA and 50 ml of sample water require 20 ml of same EDTA before boiling and 15 ml after boiling. [CO-1 / 5 Marks]

OR

a) Discuss alkalinity and its types & how will you determine alkalinity of water sample using phenolphthaleine and methylorange as indicator.

b) Differentiate between scale and sludge .. [CO-1 / 5 Marks]

Q2.a) Compare lime soda, Zeolite and Ion exchange process..

b) The hardness of 10,000 litres of a water sample was completely removed by a Zeolite softener. The exhausted softener required 58.5 litres of NaCl solution, containing 100g/litre of NaCl for regeneration. Calculate Hardness of water in ppm. [CO-1 / 5 Marks]

OR

A water sample on analysis gave following data: Free acid = 1.5ppm, CO_2 4.4 ppm, CaSO_4 = 13.6 ppm, MgCl_2 = 9.5 ppm, HCO_3^- 6.1ppm. Calculate amount of lime (91% pure) and soda (97.2% pure) needed for treating one million litres of water. [CO-1 / 5 Marks]

Q3.. Describe the determination of Flash and Fire point using Pensky Martyn apparatus (construction, procedure & diagram). [CO-2 / 5 Marks]

OR

(a) Discuss Lubricants and their functions.

(b) Analyze and describe the mechanism of lubrication for delicate scientific instruments [CO-2 / 5 Marks]

Q4. Explain the properties with their determination and significance

1) Aniline point

2) cloud and pour point.

[CO-2 / 5 Marks]

OR

a) Discuss solid lubricants, & give a detail account of Graphite..

b) An oil sample under test has a saybolt Universal Viscosity same as that of Standard Gulf oil and Pennsylvanian oil at 210°F . Their Saybolt Universal Viscosity at 100°F are 450, 750 and 320 seconds respectively. Calculate viscosity-index of the sample oil.