

[5931]-1003

F.E.

ENGINEERING CHEMISTRY
(2019 Pattern) (107009)

Time : 1 Hour

[Max. Marks : 30]

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right indicate full marks.
- 3) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 4) Assume Suitable data if necessary.
- 5) Answer Question No. Q1 or Q2, Q3 or Q4.

Q1) a) What is EDTA? Give its structure. Explain the process for water hardness determination using EDTA with reactions. [5]

b) Explain boiler corrosion due to dissolved gases oxygen and carbon dioxide with reactions. [4]

c) 100mL water consumed 5.2mL, 0.02M HCl up to phenol phthalein in and point and 15.8mL at methyl orange and point in titration. Find amount and types of alkalinity in water. [3]

d) What are zeolites? Give reactions for :
 i) Removal of Ca^{++} and Mg^{++}
 ii) Regeneration of exhausted zeolite. [3]

OR

Q2) a) Define scales. Give any four causes of scale formation in boiler. [5]

b) Explain process of reverse osmosis for separation of salts from water with neat labeled diagram. [4]

c) 50mL water sample required 18mL 0.05M EDTA in a hardness determination experiment. Whereas 50mL of the same water after boiling consumed 9mL 0.05M EDTA. Calculate Total, Permanent and temporary Hardness of water sample. [3]

d) A zeolite bed exhausted by softening 4000 liter of water requires 10 liters of 15% NaCl solution for regeneration. Calculate hardness of water. [3]

Q3) a) Explain three stages of pH metry titration between HCl & NaOH with titration curve and reactions. [5]

b) Give construction working with diagram of glass electrode. [4]

c) Give composition of membrane of ion selective Electrode used to detect [3]

- i) H^+
- ii) F^-
- iii) Cl^-

d) Define: i) Equivalent conductance
ii) Molar conductance
iii) Cell constant [3]

OR

Q4) a) Explain conductometry Titration curve for neutralization of strong acid using strong base with reactions. [5]

b) Give construction, working with neat labled diagram of calomel Electrode. [4]

c) Write any two advantages of instrumental methods of analysis. Give stepwise process for calibration of a pH-meter. [3]

d) What is a buffer solution? Give its types with example each. [3]

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