Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 2

PA-1680

[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 : **[3]**

i) Removal of Ca^{++} and Mg^{++}

ii) Regeneration of exhausted zeolite.

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 boilling 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]**

P.T.O.

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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