Total No. of Questions : 4]

SEAT No. : ____

P3

[Total No. of Pages : 2

FE/Insem./APR - 3
F.E. (Semester - II)
107009 : ENGINEERING CHEMISTRY
(2019 Pattern)

Time : 1 Hour] ***[Max. Marks : 30***

Instructions to the candidates:

1) ***Solve either Q. No. 1. or Q. No. 2. and Q. No. 3. or Q. No. 4.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logrithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain procedure for EDTA method of determining of total hardness of water sample. Draw metal EDTA complex and give chemical reactions involved. **[5]**

b) Explain causes, disadvantages and preventive measure of caustic embrittlement. **[4]**

c) Give exchange reactions of zeolite with following salt. **[3]**

i) $Ca(HCO_3)_2$ ii) $MgCl_2$ iii) $CuSO_4$

d) 100 ml of an alkaline water sample requires 5.2 ml of 0.02 m Hcl up to phenolphthalein end point and 15.8 ml for methyl orange end point. Find the type and amount of alkalinity in water sample. **[3]**

OR

Q2) a) Describe deionization method with figure, process, ion exchange reactions for softening of hard water **[5]**

b) What is priming and foaming? Give any three disadvantages of priming and foaming. **[4]**

c) 50 ml of water sample require 18 ml of 0.05 M EDTA during titration. Whereas 50 ml of boiled water sample, require 12.5 ml of same EDTA in the titration. Calculate total, temporary and permanent hardness of water sample. **[3]**

P.T.O.

d) A zeolite bed exhausted by softening 4000 lit. of water requires 10 litres of 15% Nacl solution for regeneration calculate the hardness of water sample. **[3]**

Q3) a) What is reference electrode? Give construction of calomel electrode with labelled diagram and its representation. **[5]**

b) What are ion selective electrode? Discuss the composition and working with labelled diagram of fluoride ion selective electrode. **[4]**

c) Define the following terms:- **[3]**

i) Specific conductance

ii) Cell constant

iii) Equivalent conductance

d) Give the procedure for standardisation of PH - meter. **[3]**

OR

Q4) a) Draw and explain the various stages of PH metric titration curve for the titration of Hcl Vs NaoH. Give the reactions involved in it. **[5]**

b) Give the constructions of glass electrode with labelled diagram, its representation and applications. **[4]**

c) Explain why **[3]**

i) In weak acid and weak base conductometric titration the conductance remains nearly constant after equivalence point.

ii) In conductometric titration of weak acid and strong base the conductance increases till equivalence point.

d) Explain the construction of conductivity cell with labelled diagram. **[3]**