

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 logarithmic 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) $\text{Ca}(\text{HCO}_3)_2$ 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]
- Specific conductance
 - Cell constant
 - 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]
- In weak acid and weak base conductometric titration the conductance remains nearly constant after equivalence point.
 - 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]
