

Total No. of Questions : 4]

SEAT No. :

P1270

[Total No. of Pages : 2

**OCT/FE/INSEM-3**  
**F.E. (Phase - I)**  
**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 wherever 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) Describe Deionisation method of water softening with ion - exchange and regeneration reactions. [5]
- b) Explain the causes and give preventive measures of caustic embrittlement in boilers. [4]
- c) What is hardness of water? Define temporary and permanent hardness. [3]
- d) Water sample is not alkaline to phenolphthalein. However, 25 ml of this water sample on titration required 4.5ml 0.02 N HCl for methyl orange end point. Determine the type and amount of alkalinity present in water. [3]

OR

- Q2)** a) Define scales. Explain in brief four causes of deposit formation in boilers. [5]
- b) What is reverse osmosis? Describe the process with labelled diagram. [4]
- c) The hardness of 50000 litres of water sample was removed by passing it through a zeolite bed. The zeolite bed then required 200 liters of NaCl solution, containing 100 g / liter of NaCl for regeneration. Calculate the hardness of water sample. [3]
- d) 25 ml of water sample required 8.8 ml of 0.01M EDTA to reach the end - point . 25 ml of the same water sample after boiling and filtration required 6.5 ml of the same EDTA solution to reach the end - point . Calculate total and permanent hardness of the water sample. [3]

**P.T.O.**

- Q3)** a) Explain the three stages of pH metric titration between strong acid and strong base with titration curve and reaction. [5]
- b) What is a reference electrode? Explain the construction of calomel electrode with labelled diagram and give its representation. [4]
- c) Explain the construction of a conductivity cell with labelled diagram. [3]
- d) Give the composition of the membrane of the ion selective electrode used for the determination of  $H^+$ ,  $F^-$  and  $Cl^-$ . [3]

OR

- Q4)** a) Explain the three stages of conductometric titration between strong acid and strong base with titration curve and reaction. [5]
- b) What are Ion Selective Electrodes? Give the composition and working of enzyme based membrane for determination of urea, with figure. [4]
- c) Define the following terms and give their SI units. [3]
- i) Equivalent conductance
- ii) Specific conductance
- d) Which are the different types of buffer solutions? Give example of each type. [3]

