

Total No. of Questions : 4]

SEAT No. :

PD2

[Total No. of Pages : 2

[6408]-102

F.E. (Insem)

ENGINEERING CHEMISTRY

(2019 Pattern) (Credit System) (Semester-II) (107009)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Solve either Q.1 or Q.2, Q.3 or Q.4.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*

Q1) a) Define scales. Explain four causes of scale formation in boilers. **[5]**

b) Define the following terms- **[4]**

- | | |
|-----------------------|------------------------|
| i) Temporary hardness | ii) Permanent hardness |
| iii) Foaming | iv) Electrodialysis |

c) What are zeolites? Give the exchange and regeneration reactions involved in zeolite process for softening of water containing MgSO_4 . **[3]**

d) Water sample is not alkaline to phenolphthalein 25ml of this sample on titration required 6.2ml of 0.02 N HCl for complete neutralisation. Determine the types and amount of alkalinities present in water. **[3]**

OR

Q2) a) Explain boiler corrosion due to dissolved gases and give one method each for removal of these gases. **[5]**

b) What is reverse osmosis? Describe the process with diagram. **[4]**

c) 25ml of hard water sample required 9.2ml of 0.01M EDTA to reach the end-point. The water sample was then boiled and filtered. 25ml of this water sample required 4.9ml of 0.01M EDTA to reach the end-point. Calculate total and permanent hardness of water. **[3]**

d) Hardness of 10000 litres of water was removed by passing through a zeolite bed. The zeolite bed was regenerated by passing 100 litres of brine containing 20g/lit of NaCl. Calculate the hardness of water. **[3]**

P.T.O.

- Q3)** a) Explain the three stages of conductometric titration between weak acid and weak base with titration curve and reaction. [5]
- b) Give the composition of the membrane and explain the working with figure of ion-selective electrode for determination of urea. [4]
- c) Define the following terms and give their units- [3]
- i) Specific conductance
 - ii) Equivalent conductance
- d) What is a buffer solution? Give the process for calibration of pH meter. [3]

OR

- Q4)** a) Explain the three stages of pHmetric titration between NaOH and HCl with titration curve and reaction. [5]
- b) Explain the construction of calomel electrode with figure and give its representation. Give two disadvantages of calomel electrode. [4]
- c) Give composition of the membrane of ion-selective electrode used for determination of H^+ , F^- and Cl^- . [3]
- d) Discuss the construction of conductivity cell with figure. [3]

