Total No. of Questions : 4]

SEAT No. :

PE-522

[Total No. of Pages : 2

[6577]-3
F.E. (Insem.)
ENGINEERING CHEMISTRY
(2019 Pattern) (Semester - I) (107009)

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

Instructions to the candidates :

1) ***Attempt Q.1 or Q.2 and Q.3 or Q.4.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
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) Draw block diagram of Deionisation method. Give ion exchange and regeneration reactions of any one hardness causing salt. **[5]**

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

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

i) Sludge

ii) Temporary hardness

iii) Electrodialysis

d) The hardness of 50,000 liters of a water sample was removed by passing it through a zeolite softener. The softener then required 200 liters of NaCl solution containing 125 gm/lit of NaCl for regeneration. Calculate the hardness of water sample. **[3]**

OR

Q2) a) Define scale. Give any four causes of scale formation in boiler. **[5]**

b) What is Reverse Osmosis? Describe the process with neat labelled diagram. **[4]**

c) 50 ml of water sample requires 15 ml of 0.02 M EDTA during titration where as, 50 ml of boiled water sample requires 11 ml of same EDTA in the titration. Calculate total, permanent & temporary hardness of water. **[3]**

d) Water is not alkaline to phenolphthalein. However, 100 ml of water sample on titration with N/50 H_2SO_4 required 16.5 ml for methyl orange end point. Determine the type and amount of alkalinity present in water. **[3]**

P.T.O.

Q3) a) Explain three stages of pH metry titration between HCl and NaOH with titration curve and reactions. **[5]**

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

c) What are the types of buffer solutions? Give example of each type. **[3]**

d) Define the following terms : **[3]**

i) Cell constant

ii) Molar conductance

iii) Equivalent conductance

OR

Q4) a) What is Ion selective Electrode. Give the composition and working of enzyme based membrane for urea determination with diagram. **[5]**

b) What is reference electrode? Explain the construction of calomel electrode with labelled diagram and its representation. **[4]**

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

d) Draw conductometric titration curve of : **[3]**

i) Strong Acid & strong Base

ii) Strong Acid & weak Base

iii) Weak Acid & strong Base

⌘⌘⌘