DIT UNIVERSITY DEHRADUN

B.TECH MID TERM EXAMINATION, ODD SEM 2022-23 (SEM I)

Roll No. | | | | | | | | | | |

Subject Name: Engineering Chemistry

Time: 2 Hours **Total Marks: 50**

Note: All questions are compulsory. No student is allowed to leave the examination hall before the completion of the exam.

Q.1) Attempt all Parts :

(a) Describe the procedure and name of the chemicals used for the regeneration of ion exchange resins.

(b) Write two applications of the Electrochemical Series.

(c) Calculate the cell potential of the Zinc electrode dipped in 0.1M zinc sulphate solution at 25^0C. The standard electrode potential of zinc ions is 0.76V.

(d) Differentiate between dry corrosion and wet corrosion with suitable reactions.

[4 x 2.5= 10]

Q.2) Attempt all Parts :

(a) How can we differentiate between the temporary and the permanent hardness of water?

(b) Describe how Zeolite can be used to remove hardness of water? What are the limitations of this process?

(c) The Cu^{2+} ion concentration in a copper-silver electrochemical cell is 0.1M. If $E^o(Ag^+/Ag)$ = 0.8V, $E^o(Cu^{2+}/Cu)$ = 0.34V, and Cell potential (at 25°C) = 0.422V, find the silver ion concentration.

(d) Give the main difference between scales and sludge?

[4 x 2.5= 10]

Q.3) Attempt any Two Parts :

(a) What are the factors affecting the rate of corrosion?

(b) Define transport number. Describe the method used to determine the transport number with diagram.

(c) A sample of water on analysis has been found to contain the following impurities: $Mg(HCO_3)_2$ = 22 mg/L , $MgCl_2$ = 30 mg/L, $CaSO_4$ = 28 mg/L, $CaCl_2$ = 85 mg/L. Calculate the temporary and permanent hardness in ppm.

[2 x 5= 10]

Q.4) Attempt any Two Parts :

(a) Discuss conditioning processes for hard water. Give equations wherever necessary.

(b) What are the applications of conductometric titrations? Discuss the conductometric titrations by considering the case of Strong acid and Strong base with an appropriate graph.

(c) Explain the following:

a) Cold Lime-soda process

b) Hot Lime-soda process

[2 x 5= 10]

Q.5) Attempt any Two Parts :

(a) Discuss all the desalination process for drinking water. Give diagram and equations wherever necessary.

(b) Write short notes on

I. Galvanic corrosion

II. Calomel Electrode

(c) Which are the factors affecting conductance of an electrolytic solution? Discuss each factor in detail.

[2 x 5= 10]

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