Question Paper

Exam Date & Time: 27-Feb-2023 (02:30 PM - 05:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST SEMESTER B.TECH. EXAMINATIONS - FEBRUARY/MARCH 2023 SUBJECT: CHM 1071 / CHM-1071 - ENGINEERING CHEMISTRY (MAKEUP)

Marks: 50

Duration: 180 mins.

Answer all the questions.

1A)	Derive the Nernst equation for a single electrode. Consider the following cell: Ni/Ni ²⁺ (0.01 M)// Cu ²⁺ (0.05 M)/Cu. The standard reduction potential of Ni and Cu are -0.25 V and 0.34 V respectively. Write the electrode reactions and calculate the EMF of the cell at 298 K.	(4)
1B)	i) Give reason: Zinc displaces copper from CuSO ₄ solution but silver does not. ii) Describe the construction, working and applications of a lithium ion cell.	(4)
1C)	 Give reason for following: i) Calomel electrodes should not be used above 50°C. ii) Ordinary glass electrode does not give accurate pH readings of solutions having pH values above 10. 	(2)
2A)	 i) With an illustration explain the conductometric titration of weak acid verses strong base. ii) Write the expression for Beer-Lambert's law. Give any two limitations. 	(4)
2B)	Describe with a schematic diagram, the following processes used for desalination of waste water i) Reverse Osmosis ii) Electrodialysis	(4)
2C)	Describe the preventive measures taken to avoid priming and foaming.	(2)
3A)	Discuss the electrochemical theory of corrosion.	(4)
3B)	 Give reason for the following: i) Corrosion is greater in the coastal region than in a dry inland area. ii) The corrosion of zinc is faster than iron when in contact with copper in a medium. iii) Iron bolts and nuts are not used in copper boilers. iv) Anodic protection cannot reduce the corrosion rate to zero. 	(4)
3C)	Explain the type of corrosion in mild steel boilers fed with water softened by lime soda process.	(2)
4A)	 i) Describe how the structure of polymer influences the tensile strength. ii) Calculate the number average and weight average molecular weight of a polymer sample in which 40% molecules have molecular mass of 25000, 20% have molecular mass of 30000 and 40% have molecular mass of 55000. 	(4)
4B)	Explain the classification of thermotropic liquid crystals.	(4)
4C)	With an appropriate example, write how nanomaterials are classified based on dimension.	(2)
5A)	Explain the methods of cleaning the metal surface before electroplating.	(4)
5B)	Explain the following with suitable example: i) Any two factors affecting Tg. ii) Dipole-induced dipole interaction and London forces.	(4)
5C)	Explain the role of addition of Hydrazine (N_2H_4) and $ZnSO_4$ in corrosion inhibition.	(2)

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