CYE12

RAMAIAH
Institute of Technology

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(Autonomous Institute, Affiliated to VTU)
(Approved by AICTE, New Delhi & Govt. of Karnataka)
Accredited by NBA & NAAC with 'A+' Grade

SEMESTER END EXAMINATIONS – MAY 2023

Program : **B.E :- Common to ECE / EEE / EIE / ETE / MLE**
Course Name : **Engineering Chemistry**
Course Code : **CYE12**

Semester : **I**
Max. Marks : **100**
Duration : **3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1.	a)	What is single electrode potential? Derive Nernst equation for single electrode potential.	CO1	(08)
	b)	Describe the construction, working and any two applications of Lithium ion battery.	CO1	(06)
	c)	Define concentration cell. Represent the cell formed by the coupling of two zinc electrodes immersed in zinc sulphate solutions. If two Zn electrodes were in contact with Zn ions, emf of the cell was found to be 0.065V. If concentration of solution at cathode is 0.1M, calculate concentration of other solution.	CO1	(06)
2.	a)	Outline the following characteristics of battery: (i) Capacity (ii) Energy density (iii) Voltage.	CO1	(08)
	b)	Describe the construction and working of Ni-MH battery with relevant reactions during discharge.	CO1	(06)
	c)	Define single electrode potential. When a Cu electrode is kept in contact with its solution at 25°C, electrode potential is found to be 0.345V. Calculate concentration of solution. (Given E°_{Cu} = 0.33V)	CO1	(06)

UNIT - II

3.	a)	When Fe is exposed to moist environment undergoes corrosion leading to the formation of rust. Explain the electro chemical theory of mechanism of corrosion by considering all the possible types of corrosion environments. Write the chemical formula of rust.	CO2	(08)
	b)	Illustrate the type of corrosion that occurs when (i)Steel pipe is connected to copper plumbing (ii) Presence of small dust particle on iron surface for long time	CO2	(06)
	c)	What is cathodic protection? Explain sacrificial anodic method of corrosion control. Write an example where this method is employed.	CO2	(06)
4.	a)	What is anodizing? Outline the process involved in anodizing of aluminium article.	CO2	(08)
	b)	How the following factors affect rate of corrosion. (i) Nature of corrosion product (ii) pH of the medium (iii) Relative anode and cathodic area.	CO2	(06)
	c)	Illustrate differential aeration corrosion with an example.	CO2	(06)

UNIT - III

5.	a)	Outline the principle, construction and working of organic light emitting diodes with a neat diagram.	CO3	(08)
	b)	Discuss the classification of liquid crystals with suitable examples.	CO3	(06)
	c)	Describe the synthesis of Teflon and list any two properties and applications.	CO3	(06)

6.	a)	Define conducting polymers. Explain the mechanism of conduction in polyacetylene.	CO3	(08)
	b)	Define Glass transition temperature. Describe how intermolecular forces and flexibility affects glass transition temperature.	CO3	(06)
	c)	Describe liquid crystalline behavior in PAA series.	CO3	(06)

UNIT- IV

7.	a)	Account for the following: (i) While estimating Fe by potentiometric sensor, there is sudden jump in the potential at one point. (ii) Estimation of Cu by colorimetry requires 610 nm light for measuring absorbance (iii) Nanomaterials are preferred as catalysts rather than bulk counterparts.	CO4	(08)
	b)	How are nanomaterials are prepared by Hydrothermal synthesis method?	CO4	(06)
	c)	What are ion selective electrode? How pH is determined using ion selective electrode?	CO4	(06)
8.	a)	What is the principle of Potentiometric sensors? How iron is determined by using potentiometric sensors?	CO4	(08)
	b)	(i) What are nanomaterials? (ii) List the techniques used for nanomaterials characterization. (iii) Give any three applications of nanomaterials in various fields?	CO4	(06)
	c)	What is principal of colorimetry? Give procedure to estimate Cu by colorimetry.	CO4	(06)

UNIT - V

9.	a)	What are fuel cells? Explain with neat labeled diagram the working of Methanol-oxygen fuel cell.	CO5	(08)
	b)	What are the sources and types of E waste? Give the major constituents of E waste.	CO5	(06)
	c)	Explain polymer electrolyte fuel (PEF) cells. Give any two differences between Methanol-O_2 and PEF.	CO5	(06)
10.	a)	Explain the detailed procedure for the extraction of gold from E-waste. List any three advantages of E waste recycling?	CO5	(08)
	b)	What is photo voltaic cells? Give the working mechanism of PV cells.	CO5	(06)
	c)	Give elaborative discussion on 'effect of E-waste on human health and environment'.	CO5	(06)

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