03GXCYT122122402

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY B.Tech Degree S1 (S) Examination May 2025 (2024 Scheme)

Course Code: GXCYT122

 Course Name: CHEMISTRY FOR INFORMATION SCIENCE / ELECTRICAL SCIENCE

 Max. Marks: 60
 Duration: 2 hours 30 minutes

PART A

	(Answer all questions. Each question carries 3 marks)	СО	Marks
1	What is galvanic series and compare it with electrochemical series.	CO1	(3)
2	Consider the following half-reactions:	CO1	(3)
	$Fe^{3+} + 1e^- \rightarrow Fe^{2+}, E^0(_{Fe3+/Fe2+}) = +0.77 V$		
	$Al^{3+} + 3e^{-} \rightarrow Al(s) E^{0}(_{Al3+/Al}) = -1.66 V$		
	In a galvanic cell, the concentration of Fe^{3+} is 0.10 M, the concentration of		
	Fe^{2+} is 0.01 M, and the concentration of Al^{3+} is 0.50 M. Write the overall cell		
	reaction and calculate the EMF of the cell at 25°C.		
3	Write the synthesis and two properties of polypyrrole.	CO2	(3)
4	What are nanomaterials? Classify the following nanomaterials based on	CO2	(3)
	dimension.		
	(a) Zinc nanorod (b) Graphene sheet (c) Gold nanoparticles (d) Carbon		
	nanotubes.		
5	State and explain Beer Lambert's law.	CO3	(3)
6	Dipole moment of CO ₂ is zero, but its asymmetric stretching is IR active.	CO3	(3)
	Give reason.		
7	List out any three sustainable development goals.	CO4	(3)

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Calculate the carbonate and non-carbonate hardness of a sample water CO4 (3) containing 43.8 mg/L of Mg(HCO₃)₂, 32.4 mg/L of Ca(HCO₃)₂, 27.2 mg/L of CaSO₄.

PART B

(Answer any one full question from each module, each question carries 9 marks)

Module -1

9	a)	Explain the construction and working of Li-ion cell.	COI	(5)
	b)	What is electrochemical corrosion? Explain with an example.	COI	(4)
10	a)	What are reference electrodes? Give examples for primary reference and	COI	(5)
		secondary reference electrodes and draw their electrode diagram.		
	b)	Compare electroplating and electroless plating.	COI	(4)
		Module -2		
11	a)	Explain sol-gel method for the synthesis of metal oxide nanoparticles.	CO2	(5)
	b)	Explain the applications of nanomaterials in medicine and electronics.	CO2	(4)
12	a)	Explain the working of Dye-Sensitized Solar Cells (DSSC) with the help of	CO2	(5)
		neat diagram.		
	b)	Distinguish intrinsically conducting polymers and extrinsically conducting	CO2	(4)
		polymers.		
		Module -3		
13	a)	Explain the instrumentation of UV spectrophotometer with a neat labelled	CO3	(5)
		diagram.		
	b)	Distinguish secondary electron (SE) and back scattered electron (BSE) in	CO3	(4)
		Scanning Electron Microscopy (SEM).		
14	a)	Why IR spectroscopy is also termed as vibrational spectra. Distinguish	CO3	(5)
		bending and stretching vibrations of a molecule with example.		

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b) A 100ppm standard solution of Fe³⁺ after developing colour with excess CO3 (4) ammonium thiocyanate solution shows a transmittance of 0.4 at 628 nm, while an unknown solution of Fe³⁺ after developing colour with excess ammonium thiocyanate solution shows a transmittance of 0.6 at same wave length. Calculate the concentration of Fe³⁺ in the unknown solution.

Module -4

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- a) What are ion exchange resins? Explain ion exchange process used for CO4 (5) demineralisation of water.
- b) Define e-waste and discuss its environmental impacts. Explain the CO4 (4) importance of proper disposal methods for e-waste.
- a) What is disinfection of water? Explain different water disinfection methods. CO4 (5)
 - b) Explain the role of greenhouse gases in climate change. Name at least three CO4 (4) major greenhouse gases and discuss their impact on global warming.
