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BCHEE102/202

First/Second Semester B.E./B.Tech. Degree Examination, Dec.2023/Jan.2024
Chemistry for EEE Stream

Time: 3 hrs. | Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. VTU Formula Hand Book is permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	**a.**	Explain the band diagrams for conductors and insulators.	7	L2	CO1
	b.	Describe the production of electronic grade silicon from quartz by Czochrolski method.	7	L2	CO1
	c.	Explain the preparation, properties and commercial applications of graphene oxide.	6	L2	CO1
		OR			
Q.2	**a.**	What are conducting polymers? Explain the mechanism of polyacetylene.	7	L2	CO1
	b.	What is electroless plating? Describe electroless plating of copper in the manufacture of double-sided PCB.	7	L2	CO1
	c.	In a polymer sample 20% of molecules have molecular mass 15000 g/mol. 45% molecules have molecular mass 25000 g/mol remaining molecules have molecular mass 27,000 g/mol. Calculate number average and weight average molecular weight of the polymer.	6	L3	CO1
		Module – 2			
Q.3	**a.**	What are batteries? Explain the classification of batteries with suitable examples.	7	L2	CO2
	b.	What are photovoltaic cells? Describe the construction and working of a photovoltaic cell.	7	L2	CO2
	c.	Explain the construction and working of li-polymer battery. Mention its applications.	6	L2	CO2
		OR			
Q.4	**a.**	Explain the construction and working of vanadium redox flow battery. Mention its applications.	7	L2	CO2
	b.	What are fuel cells? Explain the construction and working of methanol-oxygen fuel cell. Mention its applications.	7	L2	CO2
	c.	Explain the construction and working of Na-ion battery.	6	L2	CO2
		Module – 3			
Q.5	**a.**	What is metallic corrosion? Explain the electrochemical theory of corrosion, taking iron as an example.	7	L2	CO3
	b.	What is corrosion penetration rate? Calculate the CRR in both MPY and MMPY for a thick steel sheet of area 100 inch^2, which experience a weight loss of 485 g after one year (density of steel 7.9 g/cm^3).	7	L3	CO3
	c.	Describe the extraction of copper and gold from E-waste.	6	L2	CO3
		OR			
Q.6	**a.**	Write notes on: (i) Differential metal corrosion (ii) Differential aeration corrosion	7	L2	CO3
	b.	Explain the sacrificial anode method for the corrosion control.	6	L2	CO3
	c.	What is e-waste? Describe the effects of e-waste on environment and human health.	7	L2	CO3

Module – 4					
Q.7	a.	What are nanomaterials? Explain the any two size dependent properties of nanomaterials.	7	L2	CO4
	b.	What are pervoskite materials? Mention the properties and applications of perovskite materials in opto electronic devices.	7	L2	CO4
	c.	Describe the synthesis of nanomaterials by co-precipitation method.	6	L2	CO4
OR					
Q.8	a.	Explain the synthesis of nanomaterials by sol-gel method.	7	L2	CO4
	b.	What are QLED's? Mention its properties and applications.	6	L2	CO4
	c.	Write notes on: (i) Nanophotonics (ii) Nanosensors	7	L2	CO4
Module – 5					
Q.9	a.	What are reference electrode? Explain the construction and working of calomel electrode.	7	L2	CO5
	b.	Explain the principle, instrumentation and applications of potentiometric sensor in the estimation of iron.	7	L3	CO5
	c.	The emf a cell $Ag/AgNO_{3(0.001m)}//AgNO_{3(X_m)}/Ag$ is 0.059 V at 25°C, find the value of 'X'.	6	L3	CO5
OR					
Q.10	a.	What are ion selective electrodes? Explain the construction and working principle of glass electrode.	7	L2	CO5
	b.	Explain the principle and instrumentation colorimetric sensor, mention its applications.	7	L3	CO5
	c.	Explain how the strength of a weak acid determined using a conductometric sensor.	6	L2	CO5

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