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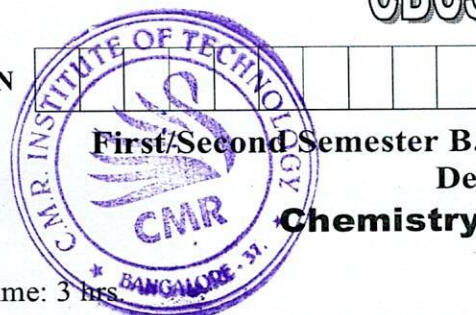**First/Second Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025**
Chemistry for EEE Stream

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 conductors, semiconductors and insulators based on band theory.	7	L2	CO1
	b.	Describe the purification of electronic grade Silicon by Float zone method.	6	L2	CO1
	c.	What are conducting polymers? Explain the mechanism of conduction in polyacetylene.	7	L2	CO1
		OR			
Q.2	a.	What is electrolessplating? Describe electroless plating of copper in the manufacture of double sided PCB.	6	L2	CO1
	b.	Explain the preparation, properties and commercial applications of graphene oxide.	7	L2	CO1
	c.	Define number average and weight average molecular weights. In a sample of a polymer, 20% molecules have molecular mass 15000 g/mol, 35% molecules have molecular 25000 g/mol and remaining molecules have molecular mass 20000 g/mol. Calculate the number average and weight average molecular weights of the polymer. Calculate PDI and comment on it.	7	L3	CO1
		Module – 2			
Q.3	a.	What are PV cells? Explain the construction and working of a typical PV cell. Mention its advantages.	6	L2	CO2
	b.	What are fuel cells? Describe the construction and working of methanol-oxygen fuel cell.	7	L2	CO2
	c.	Explain the construction and working of Lithium polymer battery. Mention its applications.	7	L2	CO2
		OR			
Q.4	a.	What are batteries? Describe the classification of battery with suitable examples.	6	L2	CO2
	b.	Explain the construction and working of Vanadium flow battery. Mention its applications.	7	L2	CO2

			M	L	C
	c.	Explain the construction and working of sodium ion battery. Mention its applications.	7	L2	CO2
		Module – 3			
Q.5	a.	Define Corrosion. Describe electrochemical theory of corrosion taking iron as an example.	7	L2	CO3
	b.	What is anodisation? Explain anodisation of aluminium and mention its applications.	7	L2	CO3
	c.	Define corrosion penetration rate. A thick brass sheet of area 400 inch^2 is exposed to moist air. After 2 years of period, it was found to experience a weight loss of 375 g due to corrosion. If the density of brass is 8.73 gram/cm^3. Calculate CPR in mpy and mmpy units.	6	L3	CO3
		OR			
Q.6	a.	What is differential aeration corrosion? Describe differential aeration corrosion with suitable examples.	7	L2	CO3
	b.	Describe sacrificial anodic method of corrosion control with example.	6	L2	CO3
	c.	What is e-waste? Describe the ill effects of e-waste on environment and human health.	7	L2	CO3
		Module – 4			
Q.7	a.	Mention the properties and application of nano sensors and nano fibers.	6	L2	CO4
	b.	Describe the synthesis of nanomaterial by Sol-gel method. Mention its advantages and disadvantages.	7	L2	CO4
	c.	What are QLED's? Mention their properties and applications.	7	L2	CO4
		OR			
Q.8	a.	What are nano materials? Explain the following size dependent properties of nano materials: (i) Surface area (ii) Conducting property (iii) Catalytic property	7	L2	CO4
	b.	What are OLED's? Mention their properties and applications.	6	L2	CO4
	c.	What are perovskites materials? Give the properties and applications of perovskites materials in optoelectronic devices.	7	L2	CO4
		Module – 5			
Q.9	a.	What are concentration cells? The emf of a cell $Ag_{(s)}/AgNO_3(0.02M)//AgNO_3(xM)/Ag_{(s)}$ found to be 0.084 V at 298 K. Write the cell reactions and calculate the value of x.	6	L3	CO5
	b.	Describe the principle, instrumentation and application of potentiometric sensors for the estimation of Iron.	7	L3	CO5

	c.	What are reference electrodes? Explain the construction and working of Calomel electrode.	7	L2	CO5
		OR			
Q.10	a.	Describe the principle, instrumentation and application of conductometric sensors for the estimation of weak acid.	7	L3	CO5
	b.	What are ion selective electrodes? Explain the construction and working of glass electrode.	7	L2	CO5
	c.	Explain the principle and working of colorimetric sensors for the estimation of copper.	6	L3	CO5

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