

# CBBCS SCHEME

USN

BCHEE102

First Semester B.E./B.Tech. Degree Examination, Jan./Feb. 2023  
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					
Q.1	a.	Explain the classification of materials as conductors, insulators and semiconductors along with a suitable example with the help of band theory.	M	L	C
			7	L2	CO1
	b.	Define the following with respect to polymers : i) Conducting polymers ii) Number average molecular weight iii) Weight average molecular weight.	6	L1	CO1
	c.	Describe electroless plating of copper with bath composition and reaction in the manufacture of double-sided printed circuit board (PCB).	7	L2	CO1
OR					
Q.2	a.	Discuss the production of electronic grade silicon by Czochralski(CZ) process.	6	L2	CO1
	b.	What are Polymers? In a sample of a polymer, 100 molecular have molecular mass $10^3$ g/mol, 200 molecular have molecular mass $10^4$ g/mol and 250 molecular have molecular mass $10^5$ g/mol. Calculate number average molecular mass weight average molecular mass and polydispersity index.	7	L3	CO1
	c.	What is graphene? Describe the preparation and properties of graphene oxide.	7	L2	CO1
Module - 2					
Q.3	a.	What are batteries? Explain the construction with a diagram and working of sodium-ion battery.	7	L2	CO2
	b.	What are fuel cells? Explain the construction with a diagram and working of methanol- oxygen fuel cell.	7	L2	CO2
	c.	List out a minimum three advantages and disadvantages of solar photovoltaic cells.	6	L1	CO2

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OR

Q.4	a.	Describe the construction, and working of Vanadium redox flow battery. Mention its applications.	7	L2	CO2
	b.	Explain the construction, working and applications of Polymer Electrolyte Membrane (PEM) fuel cell.	7	L2	CO2
	c.	Discuss the construction and working of photovoltaic cell.	6	L2	CO2

Module - 3

Q.5	a.	What is corrosion? Explain the electrochemical theory of corrosion taking iron as an example.	7	L2	CO3
	b.	Define corrosion penetration rate (CPR). Calculate the CPR in both mpy and mmpy for steel sheet of area 150 inch <sup>2</sup> which experienced a weight loss of 490g after one year. Given density of steel = 7.9g/cc.	6	L3	CO3
	c.	Discuss sources, types and effects of e-waste on environment and human health.	7	L2	CO3

OR

Q.6	a.	Demonstrate the type of corrosion taking place in the following cases : i) A steel screw in copper sheet for a long time ii) Partially buried pipeline in soil.	6	L3	CO3
	b.	What is e-waste? Explain the methods of e-waste disposal.	7	L2	CO3
	c.	Describe the extraction of copper from e-waste. Mention any two advantages of recycling.	7	L2	CO3

Module - 4

Q.7	a.	What are nanomaterials? Explain the following size dependent properties of nanomaterials : i) Surface area ii) Catalytic property iii) Conducting property.	7	L2	CO4
	b.	Describe the synthesis of nanomaterials by sol-gel method with a suitable example.	6	L2	CO4
	c.	What are liquid crystals? Explain the classification, properties and applications of liquid crystals in display systems.	7	L2	CO4

OR

Q.8	a.	Explain the properties and applications of nanofibers and nanosensors.	6	L2	CO4
	b.	Mention the properties and applications of : i) Organic Light Emitting Diode (OLED) ii) Quantum Light Emitting Diode (QLED).	7	L2	CO4
	c.	What are perovskite materials? Give the properties and applications of perovskite materials in optoelectronic devices.	7	L2	CO4

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Module – 5					
Q.9	a.	What is reference electrode? Describe the construction and working of calomel electrode.	7	L2	CO5
	b.	What are concentration cells? Explain the construction and working of electrolyte concentration cell with a suitable example.	6	L2	CO5
	c.	What are optical sensors? Explain the principle and instrumentation of colorimetric sensor.	7	L2	CO5
OR					
Q.10	a.	What are ion-selective electrode? Discuss the construction and working of glass electrode.	7	L2	CO5
	b.	What are potentiometric sensors? Explain working principle instrumentation and applications of potentiometric sensor.	7	L2	CO5
	c.	A concentration cell is constructed by combining two lithium electrodes immersed in lithium sulphate solution of concentration 0.1m and 0.1m at 298K. Write the cell representation, cell reaction and calculate the EMF of the cell.	6	L3	CO5

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