CM211IA

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RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU)

I Semester B. E. Regular / Supplementary Examinations Feb/Mar 2025

Common to AI / BT / CS / CY / CD / IS

CHEMISTRY OF SMART MATERIALS AND DEVICES

Time: 03 Hours ***Maximum Marks: 100***

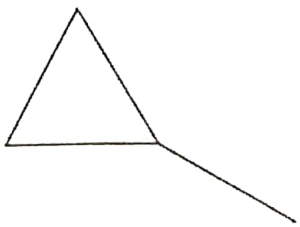
Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer SIX full questions from Part B. In Part B question number 2 and 11 are compulsory. Answer any one full question from 3 and 4, 5 and 6, 7 and 8 & 9 and 10.

PART-A

			M	BT	CO
1	1.1	Write any one requirement of biodegradeable polymers.	01	2	3
	1.2	Why hydrogels are finding enormous applications in medicine industry?	01	1	2
	1.3	Define Topological index of a molecule.	01	2	3
	1.4	Compute the platt number for the following structure. 	01	2	3
	1.5	Name any one polymeric material used in electronic memory devices.	01	3	4
	1.6	Comment on the role of polarizer in *LCD's*.	01	5	2
	1.7	Write any one requirements of a conducting polymer.	01	2	3
	1.8	Name the reducing agent used in the synthesis of Graphene oxide in modified Hummer's method.	01	3	1
	1.9	Write any one example for reserve battery.	01	3	1
	1.10	Justify the role of Solid Electrolyte Interphase in Lithium-Ion battery.	01	2	4

PART-B

2	a	Mention any three principles of green chemistry and explain in detail with suitable examples.	07	3	3
	b	Briefly explain the different steps involved in recycling of Lead acid batteries using pyro-metallurgical recycling method.	07	2	4
3	a	Discuss the following types of intermolecular forces with suitable examples: i) Van der Waals forces ii) Hydrogen bonding	07	6	3
	b	Construct the vertex-adjacency and edge-adjacency matrix for methyl cyclopropane. 	07	6	3

OR

4	a	Discuss non-covalent interactions that results in the stabilization of the protein molecule.	07	6	2
	b	Outline the steps involved in the analysis of quantitative structure-property relationships ($QSPR$).	07	2	2
5	a	What is Light Emitting Electro chemical cell ($LECs$)? Discuss the device fabrication and working principle of $LECs$.	07	1	2
	b	Explain the different steps involved in the manufacturing of semiconductor chips used in electronic devices.	07	2	2
		OR			
6	a	How $OLEDs$ are different from $LCDs$? Discuss the device fabrication and working principle of $OLEDs$.	07	1	2
	b	Mention the different types of memory devices. Explain any three of it.	07	3	1
7	a	Mention any two applications of Polyaniline and also discuss the synthesis of conducting Polyaniline.	07	3	2
	b	Construct the experimental setup and explain the procedure for the synthesis of carbon nanotubes by modified CVD method.	07	6	4
		OR			
8	a	With the help of schematic representation, explain the working principle and application of piezoelectric sensor.	07	2	2
	b	Discuss the device fabrication and working principle of electrochemical sensors for the glucose detection.	07	6	3
9	a	Write a short note on Voltage (EMF), Energy density, and Cycle life of the battery.	07	3	3
	b	Explain the working principle of $Li - CoO_2$ battery with the help of neat labeled diagram.	07	2	1
		OR			
10	a	With a neat labeled diagram, explain the construction, and working principle of the $DSSCs$.	07	2	4
	b	Mention any one difference between battery & supercapacitor. Explain the construction & working of $EDLC$ type super capacitor.	07	4	3
		LAB COMPONENT			
11	a	Outline the instrumentation, procedure and calculations involved in the estimation of copper from E-waste using colorimetric technique.	10	2	4
	b	Discuss the potentiometric principle and procedure used for the estimation of iron in the given solution using $K_2Cr_2O_7$. Explain the chemistry behind the variation of potential using required graphs.	10	6	4