

R. V. COLLEGE OF ENGINEERING
(Autonomous Institution affiliated to VTU)
DEPARTMENT OF CHEMISTRY
Course : CHEMISTRY OF SMART MATERIALS AND DEVICES
Course Code : 22CHY12A
Stream: CS

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 FIVE full questions from Part B. In Part B question number 2 and 11 are compulsory. Answer any one full question from 3 and 4, one full question from 5 and 6, one full question from 7 & 8 and one full question from 9 & 10.

PART-A

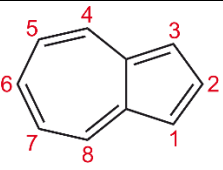
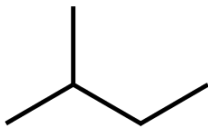
1	1.1	Identify the functional group of Poly(hydroxybutyrate-co-valerate), responsible for degradation.	1
	1.2	Define atom economy?	1
	1.3	Sketch the dipole-dipole interaction in the structure of acetone molecule.	1
	1.4	Compile the vertex-adjacency matrix for butadiene molecule.	1
	1.5	Define materials electronic memory?	1
	1.6	Predict the role of the dielectric insulator layer in organic field-effect transistor (OFET) memory device.	1
	1.7	Choose the best suitable 2D carbon nanomaterial for sensor devices.	1
	1.8	Recommend the required structure of conducting polyaniline in order to use in IoNT devices.	1
	1.9	Recalling the Li metal reactivity, name one suitable non-aqueous electrolyte.	1
	1.10	Distinguish the grey and green hydrogen.	1

PART-B

2	a	Express the meaning of biodegradable polymer? Discuss the reaction and mechanism of polylactic acid preparation.	7
	b	Convince the demerit of e-waste. Design and summarize the steps of the low temperature aqueous medium extraction method for metals from e-waste.	7

3	a	Define molecular topology? Explain the application of molecular topological descriptors in QSAR and drug design.	7
	b	Categorize and compare the different noncovalent interactions present in protein structures.	7

OR

4	a	Construct the vertex adjacency matrix for azulene and isopentane		
		 Azulene	 Isopentane	
	b	Point out the significance of topological methods in predicting various properties of polymers taking a suitable example.		7

5	a	Discuss the classification of materials with examples, used in electronic memory device.	7
	b	Define Green computing? Write a note on bio-composite based memory devices.	7
OR			
6	a	Define photo active materials? Explain the fabrication of the memory devices using photo active materials?	7
	b	Distinguish organic light emitting diode and light emitting electrochemical cells. Highlight their unique applications.	7
7	a	Summarize the meaning and application of RFID device. Explain the classifications and working principle.	7
	b	Construct the experimental setup and design the procedure for the synthesis of carbon nanotubes used in RFID.	7
OR			
8	a	Express the meaning of sensor? With the help schematic representation, explain the working principle and applications of piezoelectric sensor.	7
	b	Mention the significance of each electrodes of electrochemical sensor device and explain its application in biomolecule sensing mechanism with a suitable example.	7
9	a	Construct the working model diagram of the Li-CoO ₂ battery, explain the working principle using redox reactions of both discharging and charging.	7
	b	Name the primary battery used in calculators. Write a short note on voltage, energy density, and cycle life of the battery.	7
OR			
10	a	Define supercapacitor? Name the three types of supercapacitor and explain their structural differences.	7
	b	With a neatly labelled diagram, explain the construction, and working principle of the DSSCs.	7
11	a	With the help of Nernst equations of the iron and chromium electrodes formed during the redox titration, discuss the potentiometric principle and procedure used for the estimation of iron in the given solution. Plot the typical graphs and explain the chemistry behind the variation of potential.	10
	b	Write the neatly labelled experimental setup for the colorimetric estimation of copper in the given solution. Discuss the principle and detailed procedure.	10

Q.P.Code

UG

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PART-A

Q.No	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
B T	1	2	3	4	1	2	3	4	1	2
COs	1	3	2	2	1	2	3	4	2	2

PART-B

Question No		B T Levels	Cos addressed		Question No		BT Levels	Cos addressed
2	a	1	1		3	a	1	1
	b	4	2			b	3	1
4	a	2	1		5	a	1	2
	b	3	4			b	2	1
6	a	1	1		7	a	2	2
	b	3	4			b	4	3
8	a	2	1		9	a	2	4
	b	1	2			b	1	2
10	a	1	3		11	a	3	4
	b	2	1			b	2	3

Signature of Scrutinizer:
Name:

Signature of Chairman
Name: