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Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi

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RVCE22BCD014

Academic year 2022-2023 (Odd Sem)

(OFFLINE CIE-I FOR I SEM CS STREAM)

DEPARTMENT OF CHEMISTRY

Date	January 2023	Maximum Quiz Marks	10
Course Code	22CHY12A	Maximum Test Marks	50
Sem - I	CIE-I	Duration (Quiz + Test)	120 Min
CEMISTRY OF SMART MATERIALS AND DEVICES			

Instructions- All quiz questions should be answered in first 2 pages.

	Quiz	M	BTL	CO
1	Among the following polymers (lactic acid, polycaprolactam and cellulose) identify the natural biodegradable polymer.	1	1	1
2	Calculate the atom economy for combustion of methane, given by the equation $CH_4(g) + 2O_2(g) \Rightarrow 2H_2O(g) + CO_2(g)$. (given, atomic mass of C =12, H = 1 and O = 16)	1	3	4
3	Identify the functional group in PHBV polymer responsible for biodegradation.	1	2	3
4	In recycling of lead acid battery by pyrometallurgical process, Pb-alloy along with pure lead is obtained. Justify.	1	3	4
5	List any two advantages of battery recycling process.	1	1	2
6	Write any one cathodic reaction of Li-Air battery, when nonaqueous electrolyte is used.	1	2	3
7	Give any one hazardous effect of mercury due to leaching from e-waste.	1	1	2
8	Mention the oxidation state of Mn in $LiMnO_2$ battery before and after discharge reaction.	1	3	2
9	Justify the role of solid electrolyte interphase (SEI) in Lithium-ion battery.	1	5	3
10	Represent reserve battery symbolically.	1	2	1

Academic year 2022-2023 (Odd Sem)

(OFFLINE CIE-I FOR I SEM CS STREAM)

	Test Questions	M	BTL	CO
1	How sutures used in surgical process undergoes biodegradation? Explain the synthesis of polylactic acid with its two medical applications.	7	2	1
2	What are Hydrogels? Give an example and explain the mechanism of such hydrogels drug delivery.	7	3	3
3	Justify the importance of any four green chemistry principles with relevant examples.	7	5	4
4	Outline the recycling process of Lead acid battery by pyrometallurgy and mention any two limitations of it.	7	4	3
5	With the help of flow chart, explain the extraction of copper from PCB by Hydrometallurgy.	7	2	2
6	Explain any four-battery characteristics and mention their importance with respect to advanced battery.	8	2	2
7	Illustrate the construction and working of $LiCoO_2$ battery with charging and discharging reactions involved in it.	7	1	1

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

	Particulars	CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
Marks Distribution	Max Marks	2+14	3+15	3+14	2+7	3+7	3+2	3+7	7	1+7	
	Target	2+10	3+16	3+17	2+7						

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RVCE22BC0014

Academic year 2022-2023 (Odd Sem)

(OFFLINE CIE-II FOR I SEM CS STREAM)

DEPARTMENT OF CHEMISTRY

Date	20th February 2023	Maximum Quiz Marks	10
Course Code	22CHY12A	Maximum Test Marks	50
Sem - I	CIE-II	Duration (Quiz + Test)	120 Min
CHEMISTRY OF SMART MATERIALS AND DEVICES			

Instructions- All quiz questions should be answered in first 2 pages.

	Quiz	M	BTL	CO
1	Name the materials used as lead-free ceramic piezoelectric sensors.	1	1	1
2	Predict the possible structure of ascorbic acid due to release of two protons during electrochemical sensing.	1	3	4
3	Identify the property of polyaniline responsible for conduction.	1	2	3
4	Justify the role of electrolyte used in supercapacitor.	1	3	4
5	List any one limitation of super capacitor.	1	1	2
6	Write reduction reaction of photocatalytic water splitting.	1	2	3
7	Name the photosensitizer used in QDSSC.	1	1	2
8	At the functionalization site of CNT, mention the hybridization of carbon atom before and after functionalization.	1	3	2
9	Differentiate active and passive RFID tag.	1	5	3
10	Represent the different electrode's connections of electrochemical sensor using a diagram.	1	2	1

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Academic year 2022-2023 (Odd Sem)

(OFFLINE CIE-II FOR I SEM CS STREAM)

	Test Questions	M	BTL	CO
1	Explain the construction and working of electro chemical sensor with suitable diagram. Illustrate the working mechanism of glucose sensors used in medical application with relevant chemical reactions.	7	2	1
2	What are RFIDs? Highlight the role of nano materials in RFID and explain its working mechanism in transportation, with neat schematic diagram.	7	3	3
3	In exciton generation of organic photovoltaics, the LUMO (Donor) should be in higher energy level than LUMO (Acceptor), justify. Explain the construction and working of organic photovoltaics.	7	5	4
4	Outline the synthesis of graphene by modified Hummer's method and comment on its optical and mechanical properties.	7	4	3
5	Explain the synthesis of CNT by modified chemical vapor deposition method and explain the need of functionalisation, with an example.	7	2	2
6	Explain the following with example (i) EDLC (ii) Pseudo capacitor.	8	2	2
7	Illustrate with neat labelled diagram the construction and working of quantum dot solar cell and the reactions involved in it.	7	1	1

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

	Particulars	CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
Marks Distribution	Max Marks	2+14	3+15	3+14	2+7	3+7	3+2	3+7	7	1+7	
	Target	2+10	3+16	3+17	2+7						

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Academic year 2022-2023 (Odd Sem)

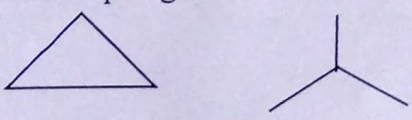
(IMPROVEMENT TEST FOR I SEM CS STREAM)

DEPARTMENT OF CHEMISTRY

Date	20th March 2023	Maximum Quiz Marks	10
Course Code	22CHY12A	Maximum Test Marks	50
Sem - I	CIE-III/Improvement Test	Duration (Quiz + Test)	120 Min
CHEMISTRY OF SMART MATERIALS AND DEVICES			

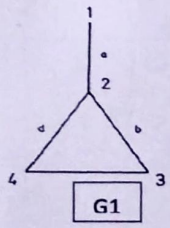
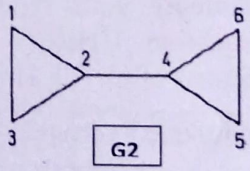
Instructions-

1. **All quiz questions should be answered in first 2 pages.**
2. **Handbook of Chemistry is permitted.**

	Quiz	Marks	BL	CO
1	List any two advantages of e-waste recycling.	1	1	1
2	Justify the role of active material in light emitting electrochemical cell (LEC).	1	3	4
3	Predict the hydrocarbon structure whose hydrogen supressed vertex adjacency matrix is $\begin{matrix}0&1&0&0\\1&0&1&0\\0&1&0&1\\0&0&1&0\end{matrix}$	1	2	3
4	Calculate the atom economy w.r.t H_2O, for combustion of methane, given by the equation $CH_4(g) + 2O_2(g) \Rightarrow 2H_2O(g) + CO_2(g)$. (Given, atomic mass of C =12, H = 1 and O = 16) 41.6	1	3	4
5	Give one example for synthetic hydrogel.	1	1	2
6	Identify the interactions between the layers of graphite.	1	2	3
7	Give any one hazardous effect of mercury due to leaching from e-waste	1	1	2
8	Identify which topological matrix is same for the following two graphs. 	1	3	2
9	Identify the interaction between sodium and chloride ion, when NaCl is dissolved in water	1	5	3
10	List two disadvantage of cache memory.	1	2	1

Academic year 2022-2023 (Odd Sem)

(IMPROVEMENT TEST FOR I SEM CS STREAM)

	Test Questions	Marks	BL	CO
1	What is liquid crystal? Explain the fabrication and working of liquid crystal display. Justify the role of TFT in TFT-LCD.	7	2	1
2	Illustrate the semiconductor chip manufacturing process with detailed explanation.	7	3	3
3	Justify the importance of any four green chemistry principles with relevant examples.	7	5	4
4	With the help of flow chart, explain the extraction of copper from PCB by Hydrometallurgy.	7	4	3
5	What is biodegradable and biocompatible polymer? Explain the synthesis of polylactic acid with its two medical applications.	7	2	2
6	What is the significance of topological matrix? Write the vertex and edge adjacency matrix for graph G1 and distance matrix for graph G2.  	8	2	2
7	What are stabilizing interactions? Illustrate the significance of stabilizing interaction with the help of electrostatic force, Hydrogen bonding and ion pair interaction in protein.	7	1	1

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

	Particulars	CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
Marks Distribution	Max Marks	2+14	3+15	3+14	2+7	3+7	3+2	3+7	7	1+7	
	Target	2+10	3+16	3+17	2+7						

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RV COLLEGE OF ENGINEERING

(An Autonomous Institution affiliated to VTU)

I Semester B. E. Examinations October-2023

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

CHEMISTRY OF SMART MATERIALS AND DEVICES

Time: 03 Hours *Maximum Marks: 100*

Instructions to candidates:

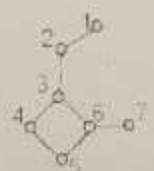
1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer SIX full questions from Part B. In Part B question number 2 and 11 are compulsory. Answer any one full question from 3 and 4, 5 and 6, 7 and 8 & 9 and 10.
3. Handbook of chemistry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

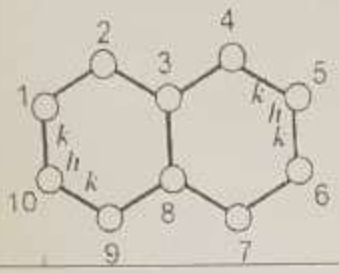
PART-A

1	1.1	Write the structure of lactide.	01
	1.2	Identify the functional group in PHBV polymer responsible for biodegradation.	01
	1.3	Identify the interaction between sodium and chloride ions, when NaCl dissolve in water.	01
	1.4	Compile the vertex adjacency matrix for 1,3-Butadiene.	01
	1.5	Write the structure of Pentacene molecules used in memory devices.	01
	1.6	Highlight the significance of bio composite based memory devices.	01
	1.7	How do you make carbon nanotube water soluble?	01
	1.8	Name the oxidant used in polymerization of aniline.	01
	1.9	Considering the Li metal reactivity, name one suitable non-aqueous electrolyte.	01
	1.10	What is the main role of solid electrolyte interphase layer in Lithium ion battery?	01

PART-B

2	a	List the environmental hazard caused by plastic. Discuss the reaction of polylactic acid preparation and propose its degradation mechanism.	07
	b	Summarize the significance of any three green chemistry principle with suitable examples. Suggest an alternative to non-biodegradable polyacrylic acid (PAC).	07
3	a	Taking suitable examples, discuss the different noncovalent interactions present in organic molecules.	07
	b	The following are the graphs of i. Methyl Ethyl Butane and ii. Azulene. Compile their vertex adjacency matrix.	07



	a	Write a significance of topological descriptors such as Zagreb Index(Z) and Wiener Number(W) taking suitable example.	07
	b	The figure below is a graph representing 2,6-diazanaphthalene. Compile the vertex and Vertex – adjacency matrix of weighted graphs. Note 'h' is hetero -atom and 'k' is bond length between hetero atom with neighboring atom. 	07
5	a	With a neat labeled diagram explain the construction and working of OLED device and highlight its importance in display technology.	07
	b	Describe the Si based semiconducting chips manufacturing process.	07
		OR	
6	a	With a neat, labeled diagram, explain the working of LCD display.	07
	b	Discuss the working of light emitting electrochemical cells (LEECS) with the schematic diagram.	07
7	a	Construct the experimental setup and design the procedure for the synthesis of carbon nanotubes used in RFID.	07
	b	Describe the modified Hummer's method for reduced grapheme oxide synthesis.	07
		OR	
8	a	Discuss the role of electrodes used in electrochemical sensor device and explain its glucose sensing mechanism.	07
	b	Explain the classifications and working principles of RFID devices.	07
9	a	With the neatly labeled diagram, explain the working principle of Li-CoO_2 battery using both discharging and charging reactions.	07
	b	Name the primary battery used in calculators. Write a short note on voltage, energy density and cycle life of the battery.	07
		OR	
10	a	How is supercapacitor different than battery? Discuss the structural and working differences of EDLC and Pseudocapacitors.	07
	b	With a neatly labeled diagram, explain the construction, and working principle of the QDSSC.	07
11	a	Discuss the conductometric principle and procedure used for the estimation of HCL in the given solution using NaOH soln. Plot the typical graph and explain the chemistry behind the variation of conductance.	10
	b	Write the neatly labeled experimental setup for the colorimetric	