

Academic year 2022-2023 (Odd Sem)  
(OFFLINE CIE-FOR ISEM 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

Instruction: All quiz questions should be answered in first 2 pages.

### Quiz

M BTL CO

- Among the following polymers (lactic acid polycaprolactam and cellulose) identify the natural biodegradable polymer.
- Calculate the atom economy for combustion of methane, given by the equation  $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$ . (given atomic mass of C = 12, H = 1 and O = 16)
- Identify the functional group in PHBV polymer responsible for biodegradation.  
In recycling of lead acid battery by pyrometallurgical process, Pb-alloy along with pure lead is obtained. Justify.  
List any two advantages of battery recycling process.
- Write any one cathodic reaction of Li-Air battery when nonaqueous electrolyte is used.  
Give any one hazardous effect of mercury due to leaching from e-waste.  
Mention the oxidation state of Mn in  $\text{LiMnO}_2$  battery before and after discharge reaction.
- Justify the role of solid electrolyte interphase (SEI) in Lithium-ion battery
- Represent reserve battery symbolically.

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

BT-Bloom's Taxonomy, CO-Course Outcomes, M-Marks

	Particulars	CO1	Co2	CO3	CO4	L1	L2	L3	L4	LS	L6
Marks	Max	Marks	2+14	3+15	3+14	2+7	3+7	32	3+7	71	7
Distribution	Target		2+10	3+16	3+17	2+7					

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Academic year 2022-2023 (Odd Sem)  
(OFFLINE CIE-1 FOR I SEM CS STREAM)

DEPARTMENT OF CHEMISTRY

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

Instructions: All quiz questions should be answered in first pages.

	Quiz	M	BTL	CO
1. Name the materials used as lead-free ceramic piezoelectric sensors.	1	1	1	1
Predict the possible structure of ascorbic acid due to release of two protons during electrochemical sensing.		3		4
3. Identify the property of polyaniline responsible for conduction.				3
Justify the role of electrolyte used in supercapacitor.				4
List any one limitation of super capacitor.		1		2
6. Write reduction reaction of photocatalytic water splitting.				
7. Name the photosensitizer used in DSSC.		1		2
8. At the functionalization 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 connections of electrochemical sensor using a diagram.		2		1

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	Test Questions	M	BTL	Co
1	Explain the construction and working of electrochemical sensor with suitable diagram. Illustrate the working mechanism of glucose sensors used in medical application with relevant chemical reactions.	7	2	1
	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
	Outline the synthesis of graphene by modified Hummer's method and comment on its optical and mechanical properties.	7		
	Explain the synthesis of CNT by modified chemical vapor deposition method and explain the need of functionalisation with an example.	7		2
	Explain the following with example (i) EDLC (ii) Pseudo capacitor.	8	2	2
	Illustrate with neat labelled diagram the construction and working of quantum dot solar cell and the reactions involved in it.	7		

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

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

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