R. V. COLLEGE OF ENGINEERING
(Autonomous Institution affiliated to VTU)
DEPARTMENT OF CHEMISTRY
CHEMISTRY OF SMART MATERIALS ND DEVICES
22CHY12A

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	Outline any one requirement of biodegradable polymers.	1
	1.2	What are hydrogels?	1
	1.3	What is Topological index of a molecule?	1
	1.4	What are skeleton graphs used in chemical systems for depicting chemical graphs?	1
	1.5	Name any one polymeric material used in electronic memory devices?	1
	1.6	What is the role of polarizer in LCD's?	1
	1.7	Identify the Band gap existing in the oxidized form of polyaniline	1
	1.8	Name the reducing agent used in the synthesis of Graphene oxide in modified Hummer's method	1
	1.9	List one example for reserve batteries?	1
	1.10	Justify the role of Solid Electrolyte Interphase in Lithium-Ion battery	1

PART-B

2	a	What is green Chemistry? Explain any three principles of green chemistry?	7
	b	Briefly mention the different steps involved in recycling process of E -Waste and explain in detail about the hydrometallurgical extraction of metals from e-waste.	7

3	a	Explain the cooperativity of hydrogen bonds in biological systems by taking an example?	7
	b	What are optimization algorithms and compare any two algorithms which can be used for finding the minimum or maximum of a function in a molecule	7
		OR	
4	a	Explain the difference between QSAR & QSPR, which are used to predict the properties of molecules	7
	b	Illustrate the electrostatic interaction existing in protein molecules and explain the relation for calculating the electrostatic force between two- point charges in an ion pair?	7

5	a	Outline the importance of green computing and explain about memory devices based on bio-composites	7
	b	Explain the different steps involved in the manufacturing of semiconductor chips.	7
		OR	
6	a	Summarize the classification of electronic memory devices based on device structure.	7

	b	Identify the difference between photo active and electroactive materials & explain the construction and working of organic light emitting diode with the help of a neat, labelled diagram.	7

7	a	What are Carbon Nanotubes? Explain the synthesis of CNT's by Modified CVD Method and its growth mechanism?	7
	b	What are Piezoelectric sensors? Explain the working principle of piezoelectric sensors and list out the applications.	7

OR

8	a	Explain the classifications and working principle of RFID Devices. List out any two applications of RFID devices.	7
	b	What are electrochemical Sensors? Explain the working principle and application of electrochemical sensor by taking one example.	7

9	a	Summarize the importance of supercapacitors and explain the structural differences of the existing three types of supercapacitors?	7
	b	With the help of neat, labelled diagram, explain the construction, and working principle of the DSSCs.	7
		OR	
10	a	Explain the construction, working and discharging & charging reactions of the Li-CoO_2 battery with the help of a neat, labelled diagram,	7
	b	What is organic photovoltaic cell? Explain the working mechanism of organic solar cells?	7

11	a	What is iodometry? Explain the principle and procedure followed in iodometric estimation of cu present in PCB Solution. Identify the role of urea, NH4OH, HNO3 and acetic acid in the experiment.	10
	b	What is the difference between the atomic emission technique & atomic absorption techniques used in the instrumental analysis of samples. Outline the principle and procedure of colorimetric estimation of copper in the given solution.	10