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RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU)

I / II Semester B. E. Regular / Supplementary Examinations Feb-2024**Common to ECE / EEE / EI / ETE****CHEMISTRY OF FUNCTIONAL MATERIALS****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	In lithium-cobalt oxide battery, identify the product formed in presence of non-aqueous electrolyte during discharging reaction of cathode.	01
	1.2	On which principle does EDLC super capacitors work?	01
	1.3	How silicon is converted into P-type semiconductor.	01
	1.4	What are optoelectronic materials?	01
	1.5	Write any one application of Gallium Arsenide.	01
	1.6	Give an example for organic semiconducting materials used in memory devices.	01
	1.7	Give one hazardous effect of lead leakage from e-waste.	01
	1.8	What is the reason to functionalize CNT?	01
	1.9	Justify the role of electrolyte in $H_2 - O_2$ fuel cell.	01
	1.10	Give an example for material used in thin film transistors.	01

PART-B

2	a	Discuss the working mechanism of lithium-air battery with neat labeled diagram. Write the reactions involved in it. Mention its applications.	07
	b	What are quantum dot sensitized solar cells (QDSSC)? Explain the construction and working of QDSSC's along with chemical reactions.	07
3	a	Explain the synthesis of nano-materials by sol-gel technique with schematic diagram by taking a suitable example.	07
	b	Explain the solution combustion synthesis of nanomaterials. Why is this technique preferred for synthesizing nano-metal oxides?	07
OR			
4	a	Describe the synthesis of graphene using modified Hummer's method. Write the properties and applications of graphene.	07
	b	What are carbon nanotubes (CNT)? Outline the synthesis of CNT using modified chemical vapour deposition technique. What are advantages of above method?	07

5	a	With a neat labeled diagram, describe the production of electronic grade silicon by Czochralski pulling technique.	07
	b	Discuss the types of materials as conductors, insulators and semiconductors along with a suitable example with the help of band theory.	07
OR			
6	a	Illustrate various structures of polyaniline along with conducting property. Write the synthetic procedure for polyaniline.	07
	b	What are dielectric storage materials? Discuss the properties and applications of dielectric materials.	07
7	a	What are thermochromic materials? Write a note on different types of thermochromic materials and explain its working mechanism.	07
	b	What is e-waste? Discuss the types and effects of e-waste on environment and human health.	07
OR			
8	a	Write a note on following i) <i>NEMS</i> ii) <i>E-nose</i>	07
	b	i) What is e-skin? Mention the importance of e-skin. ii) What are <i>RFID</i> materials? Explain its working mechanism.	07
9	a	What are electrochemical sensors? With the help of schematic representation, explain the working principle and applications of electrochemical sensors.	07
	b	Illustrate the method for monitoring oxygen saturation in blood using sensor technology.	07
OR			
10	a	Outline the determination of Ascorbic acid using electrochemical measurements along with chemical reactions and its importance.	07
	b	What are sensors? With the help of schematic representation, explain the working principle and applications of Piezoelectric sensors.	07

Lab Component

11	a	With neatly labeled experimental setup, describe the principle, procedure and working concepts involved in colorimetric estimation of copper. Mention its applications.	10
	b	With a neatly labeled experimental setup, explain the principle, procedure and working concepts involved in conductometric estimation of acid mixture using strong base. Mention its applications.	10