Q. Code:679650

Reg. No. | | | | | | | | | | | | | |

B.E./ B.TECH. DEGREE EXAMINATIONS, MAY 2024

First Semester

CY22152–ENGINEERING CHEMISTRY

(Common to AE, MN & ME)

(Regulation 2022)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Describe the fundamental concepts of electrolytic and electrochemical cells and their applications in batteries.	**2**
CO 2	Interpret the fundamental principles of photochemical processes and their applications.	**2**
CO 3	Compare and contrast nanomaterials and bulk materials, synthesis of nanomaterials and applications.	**2**
CO 4	Describe the properties and applications of engineering material.	**2**
CO 5	Explain the various types of fuels, their calorific value, and the significance flue gas analysis.	**2**

PART- A (20 x 2 = 40 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Arrange the following metals in decreasing order of their tendency to undergo oxidation: Cu, Zn, Fe. Explain the reasoning behind the order.	**1**	**2**
2.	Explain why the potential of a single electrode cannot be measured directly.	**1**	**2**
3.	Differentiate between primary and secondary batteries. Give an example of each.	**1**	**2**
4.	Define electrode potential and standard electrode potential.	**1**	**2**
5.	Distinguish between internal conversion and inter-system crossing.	**2**	**2**
6.	Differentiate between fluorescence and phosphorescence.	**2**	**2**
7.	Describe the concept of photosensitization.	**2**	**2**
8.	List the different types of electromagnetic radiation in order of increasing frequency.	**2**	**2**
9.	Identify at least four potential applications of nanomaterials.	**3**	**2**
10.	How does nanochemistry differ from nanoscience?	**3**	**2**
11.	What is lithography?	**3**	**2**
12.	In brief, explain the concept of surface Plasmon resonance.	**3**	**2**
13.	List two common abrasives and their Moh's hardness values.	**4**	**2**
14.	Write a note on abrasive paper and its applications.	**4**	**2**
15.	List two important properties of lubricants.	**4**	**2**
16.	Give two examples of Composite Materials and their applications.	**4**	**2**
17.	How is Octane Number used to rate a fuel's resistance to knocking?	**5**	**2**

18.	What is the main purpose of using a catalytic converter in a vehicle's exhaust system?	**5**	**2**	
19.	What are the different types of fuels and how are they classified?	**5**	**2**	
20.	What is a disadvantage of using the Orsat apparatus?	**5**	**2**	

PART- B (5 x 10 = 50 Marks)

		Marks	CO	RBT LEVEL
21. (a)	Explain how the calomel electrode can be used to determine the unknown electrode potential of another electrode.	**(10)**	**1**	**2**
	(OR)			
(b)	Explain the construction and working principle of a lead-acid battery and the chemical reactions that take place during charging and discharging.	**(10)**	**1**	**2**
22. (a)	Outline the key steps involved in the analysis of iron using a spectrophotometer.	**(10)**	**2**	**2**
	(OR)			
(b)	Explain the relationship between the Stark-Einstein Law of Photochemical Equivalence and Quantum Efficiency.	**(10)**	**2**	**2**
23. (a)	Distinguish between Molecules, Nanoparticles and Bulk Materials	**(10)**	**3**	**2**
	(OR)			
(b)	Explain the principles behind nanoparticle preparation using laser ablation and sputtering techniques. Briefly discuss the advantages and limitations of each method.	**(10)**	**3**	**2**
24. (a)	What are abrasives, and what properties make them useful? And explain the preparation methods of abrasive paper and cloth.	**(10)**	**4**	**2**
	(OR)			
(b)	List five different properties that make a material suitable for refractory.	**(10)**	**4**	**2**
25. (a)	What is the name of the process used to manufacture synthetic gasoline from coal? Can you provide a diagram illustrating the key steps of it?	**(10)**	**5**	**2**
	(OR)			
(b)	What is the main purpose of proximate analysis? And describe the four key components measured in a proximate analysis of coal?	**(10)**	**5**	**2**

PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	How can coal be transformed into a strong and stable fuel source like metallurgical coke? What are the key steps involved in the carbonization process, and how does the Otto Hoffmann process capture valuable	**(10)**	**5**	**2**

byproducts while creating high-quality coke?

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