K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:I
Class:FY	Program:B.Tech
Branch Code:FYE	Pattern:2022
Name of Course:Applied Chemistry	Course Code:FYE221005
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 02 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

		Marks	CO
Question No. 1			
1 a)	What is secondary battery. Describe the construction and working of a Ni-Cd battery with a neat labelled diagram and chemical reactions.	(6)	CO1
Question No. 2			
2 a)	What are the characteristics of an ideal fuel?	(3)	CO4
2 b)	1.8 gm of coal on heating at 105°C for 1 hr, leaves 1.3 gm residue. Then the coal was heated at 950°C with cover on crucible gives 1.1 gm residue. The residue on burning gives 0.11 gm constant weight. Calculate % moisture, volatile matter and ash.	(3)	CO4
Question No. 3			
3 a)	Calculate number of atoms per unit cell for SC, BCC and FCC crystal systems.	(6)	CO2
	OR		
3 b)	Explain the term atomic radius .Obtain the atomic packing factor (APF) for SC and FCC structure.	(6)	CO2
3 c)	What are conducting polymers? Discuss p-doping and n-doping with chemical reactions and state any two applications of conducting polymers.	(6)	CO2
	OR		
3 d)	Define biodegradable polymers. Discuss the key factors that affect biodegradation process. State any two applications.	(6)	CO2
3 e)	Define nanomaterials and discuss any six applications of nanomaterials.	(4)	CO1
	OR		
3 f)	Discuss the composition, properties and applications of Gun Metal Alloys.	(4)	CO1
Question No. 4			
4 a)	Describe the zeolite process used for water softening. Include a labelled diagram, the procedure, and the chemical reactions involved in both softening and regeneration.	(6)	CO4
	OR		

4 b)	What is Reverse osmosis (RO). Discuss the RO method for desalination of brackish water, along with a diagram and its key advantages.	(6)	CO4
4 c)	Define vapour pressure and viscosity with their SI units. Compare between alkaline and non-alkaline hardness.	(6)	CO4

OR

4 d)	Define soft and hard water. Explain different types of impurities present in water.	(6)	CO4
4 e)	100 ml water sample requires 7.5 ml of 0.025 M disodium EDTA to reach the end point. After boiling and filtering, 100 ml of the same sample requires 5.3 ml of the same EDTA solution. Calculate the total hardness and non-alkaline hardness of the water sample.	(4)	CO4

OR

4 f)	85 ml water sample is titrated using Mohr's method and consumes 8.6 ml of 0.01 N $AgNO_3$ to reach the brick-red end point. Determine the concentration of chloride ions in the sample.	(4)	CO4

Question No. 5

5 a)	List and briefly explain any three factors affecting the nature of a metal and any three factors affecting the nature of the environment.	(6)	CO3

OR

5 b)	Define corrosion. Explain the different types of oxide films formed on metallic surfaces, including their chemical reactions and suitable examples.	(6)	CO3
5 c)	What is immersed corrosion? Explain the hydrogen evolution mechanism with a labelled diagram and chemical reactions.	(6)	CO3

OR

5 d)	Define cathodic protection. Explain the sacrificial anode method with a neat labelled diagram, and mention any two applications of the sacrificial anode method.	(6)	CO3
5 e)	Explain the electrostatic spraying method used for corrosion control. Give any two applications of powder coating.	(4)	CO5

OR

5 f)	Briefly explain the tinning process with a labelled diagram and list its two applications.	(4)	CO5

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