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

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

Marking Scheme

End-Sem Examination-I, Winter 2025

Academic Year: 2025-2026	Semester: I
Class: FY	Program: B. Tech
Branch Code: All	Pattern: 2023
Name of Course:Applied Chemistry	Course Code:2300104A

Q. No.	Details	Max. Marks
Q.1	What is secondary battery? Describe the construction and working of a Ni-Cd battery with a neat labelled diagram and chemical reactions. (6 marks) ***(Def-1M, Construction and working- 4M, chemical reactions-1M)***	[6]
Q.2	a) What are the characteristics of an ideal fuel? (3 marks) ***(Three characteristics - 3M)*** 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 marks) ***(Moisture-1M, VM-1M, Ash-1M)***	[6]
Q.3	**a)** Calculate number of atoms per unit cell for SC, BCC and FCC crystal systems.(6 marks) ***(Number of atoms for SC-2 M, FCC-2 M, BCC-2 M)*** **OR** **b)** Explain the term atomic radius .Obtain the atomic packing factor (APF) for SC and FCC structure. (6 marks) ***(Def-1 M, APF calculation for SC -2M and FCC- 3 M)*** **c)** What are conducting polymers? Discuss p-doping and n-doping with chemical reactions and state any two applications of conducting polymer. (6 marks) ***(Def-1 M ,p and n-doping with an examples-4 M, Application- 1 M)*** **OR** **d)** Define biodegradable polymers. Discuss the key factors that affect biodegradation process. State any two applications. (6 marks) ((***Def-1 M , Factor-4 M, applications-1 M)*** **e)** Define nanomaterials and discuss any six applications of nanomaterials. (4 marks) (***Nanomaterials-1 M, Six application- 3 M)*** **OR** **f)** Discuss the composition, properties and applications of Gun Metal Alloys. (4 marks) ***(Composition-2M, Properties-1M, Applications -1M)***	[16]
Q.4	a) Describe the zeolite process used for water softening. Include a labeled diagram, the procedure, and the chemical reactions involved in both softening and regeneration. (6 marks) ***(Construction with dig. -2 M, Water softening reaction -2 M, Regeneration Reaction -2 M)*** **OR** b) What is Reverse osmosis (RO).Discuss the RO method for desalination of brackish water, along with a diagram and its key advantages. (6 marks)	[16]

	(Defination-1 M, Explanation with diagram -4 M, Application – 1 M)	
	c) Define vapour pressure and viscosity with their SI units. compare between alkaline and non-alkaline hardness. (6 marks) ***(Vapour pressure with unit- 1 M, viscosity with unit-1 M, alkaline and non-alkaline 4 points - 4M)*** **OR** d) Define soft and hard water. Explain different types of impurities present in water . (6 marks) ***(Soft and Hard water- 2M, four types of Impurities - 4 M)***	
	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 marks) ***(Total hardness-2 M, Non-alkaline hardness-2 M)*** **OR** 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 marks) (***Given and calculation -2M, Correct ans with unit-2M)***	
Q.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 marks) ***(Three factors based on nature of metal - 3M, Three factors based on nature of environment -3 M)*** **OR** b) Define corrosion. Explain the different types of oxide films formed on metallic surfaces,including their chemical reactions and suitable examples. (6 marks) (***Definition -1M,, Four types of oxide film- 5 M)***	
	c) What is immersed corrosion? Explain the hydrogen evolution mechanism with a labelled diagram and chemical reactions. (6 marks) ***(Definition -1M, dig-2M, reactions with explanation -3M)*** **OR** 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 marks) ***(Definition -1M,Dig.with explanation-4M , two applications-1 M)***	
	e) Explain the electrostatic spraying method used for corrosion control.Give any two applications of powder coating. (4 marks) (E***xplanation-3M , two applications-1 M))*** **OR** f) Briefly explain the tinning process with a labelled diagram and list its two applications. (4 marks) (***Dig.with explanation-3M , two applications-1 M))***	