



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

WINTER-2024	
Exam Seat No.:	
Academic Year:2024-2025	Semester:I
Class:FY	Program:B.Tech
Branch Code:FYE	Pattern:2023
Name of Course:Applied Chemistry	Course Code:2300104A
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) Explain different types of electronic transition that occur in an organic molecule after absorbing UV radiations with suitable examples. (6) CO4

Question No. 2

- 2 a) Draw neat labelled diagram of bomb calorimeter and give its formula to calculate the calorific value of fuel. (3) CO4
- 2 b) Coal sample contains 85% C & 15% H₂ allowed to undergo combustion in Bomb Calorimeter following data were obtained. (3) CO4

Weight of coal burnt = 1.45 gm, weight of water taken = 1250 gm, water equivalent of bomb calorimeter = 958 gm, rise in temperature = 4.8°C. Calculate GCV and NCV of the coal.

Question No. 3

- 3 a) Deduce the atomic radius and APF of face centred cubic (FCC) crystal. (6) CO2

OR

- 3 b) What is atomic radius? Calculate the number of atoms per unit cell of simple cubic crystal and body centred cubic crystal. (6) CO2
- 3 c) Classify the composites on the basis of reinforcement phase. Give three properties and three applications of polymer composites. (6) CO1

OR

- 3 d) What are the structural requirements for biodegradable polymer? Explain PHBV with its structure, properties and applications. (6) CO1
- 3 e) Explain following properties of nanomaterials with suitable example 1) Optical property 2) Electrical property 3) Mechanical property. (4) CO1

OR

- 3 f) Define the term binary alloy. Explain fusion method of synthesis of bronze alloy with diagram. (4) CO1

Question No. 4

- 4 a) Explain the ion exchange process for water softening, with a neat labelled diagram, procedure, water softening, and regeneration reactions. (6) CO4

OR

- 4 b) Define osmosis. Explain reverse osmosis method for desalination of brackish water. Give any two advantages of RO method. (6) CO4
- 4 c) Explain EDTA method for determination of hardness of water with principle, process, reactions and formulae of total hardness. (6) CO2

OR

- 4 d) Define selectivity and response time. Explain the functioning of a metal oxide-based gas sensor. Provide two applications for gas sensors. (6) CO2
- 4 e) 100 ml of water sample when titrated in Mohr's method requires 5.3 ml of 0.015 N AgNO_3 for brick red end point. Calculate the amount of chloride ions present in water sample. (4) CO5

OR

- 4 f) Zeolite bed exhausted by softening 2100 litres of a water sample requires 8 litres of 9% NaCl solution for regeneration. Calculate the hardness of the water sample. (4) CO5

Question No. 5

- 5 a) Describe the oxide film formation mechanism of direct corrosion with a diagram and reaction. Give the type of oxide film formed by Cu and Ag metals (6) CO3

OR

- 5 b) Predict the type of corrosion if the iron metal is in contact with NaOH solution? Explain its mechanism of solution corrosion with neat labelled diagram. (6) CO3
- 5 c) Distinguish between anodic and cathodic coatings. Which coating is more protective and why? (6) CO5

OR

- 5 d) Segregate the factors affecting on rate of corrosion based on metal and environment and then explain it. 1. Gaseous impurities 2. Nature of ions present in solution 3. Physical state of metal 4. Relative area of anode to cathode 5. Conductivity of solution. (6) CO5
- 5 e) What is powder coating? Explain the electrostatic spraying on metallic surfaces. (4) CO3

OR

- 5 f) What is Galvanising? Explain the process with diagram and applications. (4) CO3

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