



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:VII |
| Class:FINAL | Program:B.Tech |
| Branch Code:CHE | Pattern:2022 |
| Name of Course:Process Technology | Course Code:CHE224021 |
| 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 1 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

- 1a) Explain the main elements of a Process Flow Diagram (PFD) with a neat sketch. Compare it with a Piping & Instrumentation Diagram (P&ID) highlighting five major differences. (8) CO1

Question No. 2

- 2a) Compare biocatalysts & transition metal catalysts with examples. (6) CO1

Question No. 3

- 3a) Explain the principles of Green Technology and their role in sustainable chemical process design. (8) CO1

OR

- 3b) Explain the concept of circular economy and show how resource recovery/recycling can be applied in chemical industries. (8) CO2

- 3c) Describe atom economy and show how it contributes to Green Chemistry using suitable examples. (8) CO1

OR

- 3d) Discuss waste-minimization and resource-optimization strategies and propose a circular economy model for a chemical plant. (8) CO2

Question No. 4

- 4a) Explain the concept of sustainability and discuss key sustainable practices used in chemical process industries. (8) CO1

OR

- 4b) Describe circular economy strategies in the sugar industry with respect to energy recovery, water recycling, and waste utilization. (8) CO2

- 4c) Discuss waste generation sources in process industries. Explain how sustainability principles can be applied to minimize environmental impact. (8) CO2

OR

- 4d) Propose an integrated sustainability and circular economy plan for the sugar industry covering process, product, and by-product streams. (8) CO2

Question No. 5

- 5a) Explain the concept of a bio-refinery. Describe the major biomass conversion pathways with a neat process flow diagram. (8) CO2

OR

- 5b) Discuss the criteria for selecting biomass feedstock for bio-refinery applications. How feedstock properties influence process design? (8) CO3

- 5c) Analyze the challenges and future opportunities in scaling up bio-refinery processes, including technical, economic, and environmental factors. (8) CO3

OR

- 5d) Evaluate different bio-refinery technologies used to convert biomass into bio-fuels such as bio-ethanol, biodiesel, and bio-hydrogen. (8) CO4

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