



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

| SUMMER-2024 | |
|---------------------------------------|------------------------|
| Exam Seat No.: | |
| Academic Year: 2023-2024 | Semester: IV |
| Class: SY | Program: B.Tech |
| Branch Code: CHE | Pattern: 2022 |
| Name of Course: Mechanical Operations | Course Code: CHE222013 |
| 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 2 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.

Question No. 1 Attempt following Question

- 1a) Define Sphericity. Explain why size reduction is necessary. (6) CO1

Question No. 2 Attempt following Question

- 2a) Write Assumption for Kynch theory. (6) CO2

Question No. 3 Attempt following Question

- 3a) Explain the concept of fluidization and types of fluidization bed systems used in chemical industry. (8) CO3

OR

- 3b) Describe the minimum fluidization velocity in fluidization bed systems using neat sketch. (8) CO3

- 3c) Design calculations of belt conveyors and chain conveyors? (8) CO3

OR

- 3d) Explain with neat sketch construction and working of pneumatic conveyors. (8) CO3

Question No. 4 Attempt following Question

- 4a) What is Vertex formation? Explain with diagram. How Vertex formation can be avoided show with the help of diagrams. (8) CO4

OR

- 4b) A disk turbine with six flat blades is installed centrally in a vertical baffled tank 2m in diameter. The turbine is 0.67 m in diameter and is positioned 0.67 m above the bottom of the tank. The turbine blades are 134 mm wide. The tank is filled to a depth of 2 m with an aqueous solution of 50% (8) CO4

NaOH at 65 Degree Celsius, which has a viscosity of 12 Centipoise and density of 1,500 kg/m³. The turbine impeller turns at 90 rpm. What power will be required? (take $K_T = 5.75$)

4c) Explain Tumbling Mixer with neat Diagram. (8) CO4

OR

4d) What is Mixing index. What is significance of mixing Index. Explain Internal screw mixer with Neat Diagram. (8) CO4

Question No. 5 Attempt following Question

5a) Explain the various factors to be consider for selection of Filtration equipment. (8) CO5

OR

5b) Explain Basket type centrifugal filter with neat diagram. (8) CO5

5c) Compare pressure filter and Vacuum Filter. (8) CO5

OR

5d) Enlist and explain four filter media. Write any two advantages and disadvantages of Rotary vacuum filter. (8) CO5

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX