

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-V EXAMINATION – WINTER 2025****Subject Code:3150502****Date:21-11-2025****Subject Name: Mechanical Operations****Time: 10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

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|------------|-----|--|-----------|
| Q.1 | (a) | Discuss the characterization of solid particles. | 03 |
| | (b) | Define sphericity. Calculate the sphericity of a solid particle of cubical shape. | 04 |
| | (c) | Describe the working and construction of Trommels with neat sketch. | 07 |
| Q.2 | (a) | Which analysis is more preferable differential or cumulative? How? | 03 |
| | (b) | A set of crushing rolls of 1000 mm diameter by 375 mm width of face. Minimum spacing between two rolls is 10 mm and the angle of nip is 30. What is the maximum permissible size of feed? | 04 |
| | (c) | Classify comminuting equipment and give suitable industrial application of it. | 07 |
| OR | | | |
| | (c) | A Black jaw crusher is used for crushing limestone such that the average size of the particles is reduced from 50mm to 12 mm with energy consumption of 50 W*hr/metric ton. Calculate the energy consumption for crushing the same material from average size of 75mm to 20mm. (a) Using Rittinger's law; (b) using Kick's law (c) Bond's law. Work index=12.74. | 07 |
| Q.3 | (a) | Discuss the classification of filtration with suitable examples. | 03 |
| | (b) | Discuss Filter media and Filter aids. | 04 |
| | (c) | Explain construction and working of continuous rotary drum filter. | 07 |
| OR | | | |
| Q.3 | (a) | Differentiate clarifier and classifier. | 03 |
| | (b) | Explain construction and working of the Hydrocyclones separator. | 04 |
| | (c) | Explain in detail the working of batch sedimentation with application. | 07 |
| Q.4 | (a) | Discuss importance of mixing and agitation. | 03 |
| | (b) | Write short note on ribbon blender. | 04 |
| | (c) | Describe the different mixing equipments used for solid mixing in brief. | 07 |
| OR | | | |
| Q.4 | (a) | Enlist different types of flow pattern induced in an agitated vessel. | 03 |
| | (b) | Write short note on equipment used for cohesive solid mixing | 04 |
| | (c) | Explain different types of impellers for agitation of liquids along with application. | 07 |
| Q.5 | (a) | List out the advantages and disadvantages of fluidization. | 03 |
| | (b) | Discuss minimum fluidization velocity and pressure drop in fluidized bed with neat sketch. | 04 |
| | (c) | With neat sketch, explain pneumatic conveying system with advantages and disadvantages. | 07 |

OR

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|------------|------------|--|-----------|
| Q.5 | (a) | List different types of industrial conveyers. | 03 |
| | (b) | Discuss the different criteria's for selection of conveyors. | 04 |
| | (c) | Explain in detail: Types of fluidization. | 07 |
