

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: V CHEMICAL ENGINEERING

Subject Name: **Mechanical Operation**

Sr. No.	Course content
1.	Solids and Its Flow Properties: Characterization of solid particles, Mixed particles sizes and analysis, Screen analysis, properties of particulate masses, Mixing of solids, Mixer for cohesive solids, Mixer for free flowing solids.
2.	Size Reduction, Enlargement, Screening: Principles of comminution, Rittinger's and kick's laws, Bond's crushing law and work index, Size reduction equipments, crushers, grinders, Ultra fine grinders, Cutting machines, Open circuit and closed circuit operation, Screening equipment, Comparison of ideal and actual screens, Screen effectiveness.
3.	Fluidization and Conveying: Conditions for Fluidization, Types of fluidization, Applications of fluidization, Slurry and pneumatic transport, Conveyers.
4.	Filtration and Sedimentation : Cake filters, Filter press, Shell and leaf filters, Discontinuous vacuum filters, Continuous vacuum filters, Centrifugal filters, Filter media, Filter aids, Principles of cake filtration, Clarifying filters, Gravity classifiers, Sink and float method, Differential settling methods, Clarifiers and thickeners, Batch sedimentation, Rate of sedimentation, Thickeners, sedimentation zones in continuous thickeners, Cyclones, Hydrocyclones, Centrifuges.
5.	Mixing and Agitation: Different types of agitators and their selection criteria, Calculation of power required for agitation, Scale up of agitated vessel, Static mixers.

Practical and Term Work:

Experiments based on the above topics for the testing, identification, analysis and preparations, etc. should be given to the students.

Reference Books:

1. Unit Operations of Chemical Engg. By W.L. McCabe, J. C. Smith & Harriott, 6th Edition Mc-Graw Hill international.
2. Introduction to Chemical Engineering by W. L. Badger & J.T. Banchemo.
3. "Chemical Engineering", Volume-2, 4th edition by Coulson & Richardson.
4. Unit Operation by Brown & Associates.
5. Perry's Chemical Engineers handbook, 7th edition by Perry & Green, Mc-Graw Hill International.