

4 th Semester	RCH4D001	Mechanical Operation & Mineral Processing	L-T-P 3-0-0	3 CREDITS
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Objectives: This course acquaints the students of the mechanical method of sizing, separating & transportation of particles.

Module I: (10 hrs)

Properties and storage of solids: Characteristics of solid particles and solids in bulk. Size Reduction: Objectives, Methods, and Principles of size reduction, Size reduction equipment: Coarse, Intermediate, and Fine Crushers and Ultra-fine grinders, Open & closed circuit grinding.

Module II: (10 hrs)

Solid-solid separation: Screening, Electrical separation, Classification, Gravity concentration, and Floatation and their latest equipment.

Module III: (08 hrs)

Gas-solid separation: Principle and equipments.
Transportation of solids: Conveyors and elevators.

Module IV: (10 hrs)

Thermal methods in processing of ores: Roasting, sintering, calcination, pelletisation, and briquetting. Chemical and electrochemical methods in mineral processing: Leaching – acid and bacterial leaching, amalgamation and cyanidation.

Module V: (07 hrs)

Introduction and scope of mineral processing in extractive metallurgy. Ores and Mineral resources in India and worldwide for basic metals like iron, copper, aluminium, lead, and zinc. Physical and chemical characteristics of industrial minerals.

Beneficiation flow sheets of coal and simple ores of copper, lead, zinc, and iron with reference to Indian deposits.

Books:

- Mechanical Operations, 1st ed. by A K Swain, H Patra, and G K Roy, McGraw-Hill.
- Principles of Mineral Dressing by AM Gaudin, McGraw-Hill.
- Unit Operations of Chemical Engineering, 7th ed. by W L McCabe, J C Smith, and P Harriott, McGraw-Hill.
- Mechanical Operations for Chemical Engineers, 3rd ed. by C M Narayanan and B C Bhattacharya, Khanna Publishers.
- Perry's Chemical Engineers' Handbook, 8th ed. by D W Green and R H Perry, McGraw-Hill.
- Introduction to Chemical Engineering by W L Badger and J T Bancho, McGraw-Hill.
- Unit Operations, by G G Brown, et. al., CBS Publishers.
- Handbook of Mineral Dressing: Ores and Industrial Minerals by A F Taggart, John Wiley.