

MLPE3001 PARTICULATE TECHNOLOGY (3-0-0)

Course Objectives:

- To enhance the knowledge on characterization, handling and storage of particulates

Module-I: (06 Hrs)

Mineral sampling: Sampling of solids and slurries, principle, methods, sampling for different application, sampling systems, Indian standards. Laboratory & industrial Sampling techniques. Error in sampling

Module-II: (06 Hrs)

Properties of bulk solids: density, packing properties, abrasiveness, friability, flowability, surface roughness etc. and their measurement. Dynamic weighing concept. Blending: principle, effects of various parameters

Module-III: (06 Hrs)

Production of fine particles, Concept of equivalent diameter for small particles.

Methods of particle size measurement: Sieving, sedimentation and elutriation, Optical methods, On-line particle size measurement, Computer analysis of size distribution data.

Particle size distribution: Gaudin- Schumann, Gaudin-Meloy equation, Rosin-Rammler, Broadbent and Calcott equation.

Module-IV: (06 Hrs)

Particle shape characterization: methods, image analyzers, Surface area measurement: direct and indirect methods, permeability, gas adsorption.

Powder flow and storage: flow patterns, problems and design.

Module-IV: (06 Hrs)

Mechanical transport: Belt, bucket and screw conveyors, selection of conveyors, power consumption. Convective transport: sedimentation rate, suspension in stirred tanks, rheology of slow-settling slurries.

Course Outcomes:

After successfully studying this course, students will able to:

CO1: To understand the sampling methods used for particulate materials

CO2: To explore the knowledge on properties of bulk materials

CO3: To demonstrate proficiency in the basic concepts of particle size measurement

CO4: To explore the concept of particle shape measurement and flow properties of powdery materials

CO5: To acquire knowledge on the transport of particulate materials

Text Books

1. Rhodes M., Introduction to Particle Technology, John Wiley & Sons Inc, 2008
2. Vyas M.N., Introduction to Particulate Technology, Atlantic Publishers and Distributors Ltd, 2023

Reference Books:

1. McGlinchey D., Bulk Solids handling: Equipment Selection and Operation, Blackwell Publishing, 2008