

AMCH15 MECHANICAL OPERATION

UNIT-1 PROPERTIES AND HANDLING OF PARTICULATE SOLIDS

- 1.1 Introduction to particle technology,
- 1.2 Characterization of solid particles, particle shape and size,
- 1.3 Screen Analysis, Specific surface of mixture,
- 1.4 Standard screen series, Properties of particulate masses, Storage of solids.

UNIT-2 CONVEYORS

- 2.1 Belt-conveyor, Chain Conveyors,
- 2.2 Screw Conveyors, Pneumatic conveyors,
- 2.3 General Field of conveyors Nomenclature.

UNIT-3 MIXING OF SOLIDS AND PASTES

- 3.1 Theory of solid mixing, Equipment for solid mixing,
- 3.2 Mixers for pastes and plastic masses,
- 3.3 Mixers for dry powders, Power requirements, Mixing index in blending granular solids,
- 3.4 Rate of mixing, Criteria of mixer effectiveness, Mixing Index.

UNIT-4 SIZE REDUCTION

- 4.1 Principles of Comminution, Energy and power requirements in size reduction,
- 4.2 Laws of size reduction, Size reduction equipment's, Equipment operation,
- 4.3 Comparisons between crushing and grinding operations.

UNIT-5 SCREENING

- 5.1 Types of screening equipment,
- 5.2 Comparisons of Ideal and actual screens,
- 5.3 Material balance over screen, Screen effectiveness,
- 5.4 Capacity and effectiveness of screen,

UNIT-6 FILTRATION

- 6.1 Factors affecting on rate of filtration, Clarifying filters, Cake filters, Classification of filters,
- 6.2 Equipment's for Filtration, Filter media, Filter aids, Principles of cake filtration,
- 6.3 Principles of clarification, Pressure drop through filter cake,
- 6.4 Compressible and Incompressible filter cake, Filter medium resistance, Constant-pressure filtration, Empirical Equation for cake resistance, Constant rate-filtration,
- 6.5 Principles of centrifugal filtration, Fundamentals of micro filtration,
- 6.6 Introduction to Bio filtration, Design of filtration units.

UNIT-7 SEPARATION BASED ON MOTION OF PARTICLES THROUGH THE FLUIDS

- 7.1 Gravity Settling Process, Introduction, Gravity settling process, Free and Hindered settling,
- 7.2 Sedimentation, Centrifugal settling Processes, Cyclone separator, Hydro cyclone,
- 7.3 Centrifugal settling or sedimentation, Selection of separation equipment.

UNIT-8 MIXING AND AGITATION

- 8.1 Agitation equipment, Impellers and their characteristics,
- 8.2 Power requirements for agitation, Selection of Impellers, Scale-up of mixing system,
- 8.3 Design of mixing system.

UNIT-9 FLUIDIZATION

- 9.1 Principles of fluidization,
- 9.2 Flow through packed beds, Pressure drop-flow diagram,
- 9.3 Types of fluidization, Application of fluidization techniques,
- 9.4 Design of fluidized beds, Pneumatic conveying.

UNIT-10 BENEFICIATION PROCESSES

- 10.1 Which beneficiation process is right for your plant?
- 10.2 Filters, Jigging, Tabling, Magnetic Separations,
- 10.3 Electrostatic separations, Froth Floatation.

Reference Books:

1. Fundamentals of Momentum, Heat and Mass Transfer, Mechanical Operations for Chemical engineers Author : Welty, Wicks, Wilson & Rorrer Wiley Narayanan C.M. & Bhattacharya, B.C Publisher : Khanna Publishers
2. Backhurst, J. R. and Harker J. H., "Coulson and Richardson Chemical Engineering", Vol. II", 5th Ed., 2002, Butterworth-Heinemann.
3. Brown G.G. and Associates, "Unit Operations", 1995, CBS Publishers.

