

PNEUMATIC AND HYDRAULIC CONVEYING DESIGNS

Code	Credit Hour
MinE-849	3-0

CourseDescription

Nature and properties of bulk solids, Belt conveyor features, design, and variants, Introduction to basic pneumatic conveyor systems, Modes of conveying-dilute phase and dense phase, Low pressure pneumatic conveying system, High pressure pneumatic conveying system, Low velocity conveying and the use of supplementary air feeds, Components of pneumatic conveying systems, Pneumatic conveyor design, Air assisted gravity conveying, Hydraulic conveying design

Textbook:

1. Woodcock. C.R.and Mason. J.S.” Bulk Solids Handling: An Introduction to the Practice and Technology”. ISBN 978-94-009-2635-6

ReferenceBook:

1. Shamlou. P. A.” Handling of Bulk Solids: Theory and Practice”. ISBN-13:978-1483112091

Prerequisites

Nil

ASSESSMENT SYSTEM FOR THEORY

Quizzes	15%
Assignment	5%
Mid Terms	30%
ESE	50%

TeachingPlan

Week No	Topics	LearningOutcomes
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1	Introduction	Course Outline, objectives, teaching plan, assessment method, concepts review. Introduction to pneumatic and hydraulic conveying designs
2-4	Nature and properties of bulk solids	Introduction to bulk solids, Physical properties (size, shape, density, moisture content), Mechanical properties (flowability, compressibility, permeability), Thermal properties (heat capacity, thermal conductivity), Analysis and testing methods, Common issues in handling bulk solids
5	Belt conveyor features, design, and variants	Purpose and applications, Basic components (belts, pulleys, rollers), Design considerations (capacity, speed, length), Variants (troughed, flat, sidewall belts), Drive systems and selection, Maintenance and safety aspects
6	Introduction to basic pneumatic conveyor systems	Principles and applications, Types (positive and negative pressure systems), Key components (blowers, compressors, pipelines, receivers), System layout and design, Advantages and limitations, Case studies
7-8	Modes of conveying: dilute phase and dense phase	Introduction to dilute phase (principles, applications), Characteristics of dilute phase (high velocity, low pressure), Introduction to dense phase (principles, applications), Characteristics of dense phase (low velocity, high pressure), Comparison of dilute and dense phase, Factors influencing choice
9	MIDTERM EXAM	
10-12	Low pressure pneumatic conveying system	Overview, Design and components, Applications and limitations
13-14	High pressure pneumatic conveying system	Overview, Design and components, Applications and limitations
15-16	Low velocity conveying and the use of supplementary air feeds	Introduction to low velocity conveying, Design considerations, Advantages and challenges, Overview of supplementary air feeds, Applications of supplementary air feeds, Case studies
17	Components of pneumatic conveying systems, Pneumatic conveyor design, Air	Key components (blowers, compressors, pipelines, receivers, feeders, airlocks), Controls and instrumentation, Principles of pneumatic conveyor design, Design steps, Common design challenges,

	assisted gravity conveying, Hydraulic conveying design	Introduction to hydraulic conveying, Components and design considerations, Applications and case studies
18	END SEMESTER EXAM	