



# BULK MATERIAL TRANSPORT AND HANDLING SYSTEMS

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IIT Kharagpur

**TYPE OF COURSE** : New | Core | UG/PG

**COURSE DURATION** : 12 Weeks (24 Jan' 22 - 15 Apr' 22)

**EXAM DATE** : April 24, 2022

**PRE-REQUISITES** : Engineering Mechanics, Mechanics of Solids, Introduction to Electrical Engineering

**INTENDED AUDIENCE** : Undergraduate students of Mining, Metallurgical, Agriculture, Mechanical, Electrical, Industrial and System Engineering

**INDUSTRIES APPLICABLE TO** : CIL, HCL, NALCO, SAIL, NTPC, NLCIL, HZL, Essel Mining, JSW, BEML, HEC, L&T

## **COURSE OUTLINE :**

Any loose and unpacked material such as sand, crushed stones, blasted coal or rock mass, powdered material are referred to as bulk material. Raw materials for most of the industries are bulk materials. Mining and metallurgical industries are involved in large scale handling of bulk materials. Agriculture, food, textile, and construction industries also use bulk materials. The handling operation of bulk materials include transferring, transporting, size reduction, screening, storing, disposal, drying, weighing, etc. Such operations use different techniques and equipment depending on the characteristics of the material being handled, the quantity being handling and the degree of safety and quality to be maintained.

This course Bulk Material Handling covers the industrial materials handling machinery and brings out various aspects of their constructions, safe operation, maintenance, and repair. The topics include conveyors, feed and discharge devices, screens, and crushers, and bulk material storage systems.

## **ABOUT INSTRUCTOR :**

Prof. Khanindra Pathak done B. Tech in Mining Machinery and M.Tech in Surface Mining from IITISM, Dhanbad, PhD in Mining Engineering from Imperial College of Science Technology Medicine, London (Commonwealth Fellowship). Professor of Department of Mining Engineering, Ex-Director of Coal India Limited, Ex-HoD of Mining Engineering Department of IIT Kharagpur and University of Technology, Lae, Papua New Guniea. Chairman, Eastern Regional Committee of AICTE, Kolkata, Chairman, Board Governors TEQIP-III Dibrugarh University Institute of Engineering and Technology, Dibrugarh. Served at Neyveli Lignite Corporation of India Limited, CMPDIL, Coal India Limited, IIT(ISM) Dhanbad. Received National Mineral Award in 2016 besides other awards.

## **COURSE PLAN :**

**Week 1:** Introduction to Mining Systems: Classification of Mining systems and the bulk material handling systems

**Week 2:** Automous Vehicle for bulk material transport; Belt Conveyor: Constructional components

**Week 3:** Feed and Discharge Devices; Safety and Troubleshooting; Conveyor Design Calculations

**Week 4:** Basic design Calculations; Pneumatic Conveying

**Week 5:** Comparison of various types of stackers; Comparison of various types of Reclaimers; Case studies

**Week 6:** Bin, Bunker and Silo: Bulk Solids Flow Properties and Application to Design; Case studies examples to illustrate operational problems

**Week 7:** Screen: Classification and Selection; Monitoring and maintenance of Processing plant Equipment; Gravity concentration

**Week 8:** Froth flotation techniques, Magnetic separation; Jigs and Thickeners; Case Studies of Coal Washery Equipment and Practices

**Week 9:** Transportation Machinery for Surface Mines: Off-Highway trucks and Haul Roads; Recent Developments: hybrid system of transportation

**Week 10:** Transportation Machinery for Underground Mines: Rope Haulage; Locomotive; Low profile dumper.

**Week 11:** Introduction to Cage and Skip Winding; Winding calculations; Safety and mainteance; Case Studies.

**Week 12:** Automation and Monitoring: Basic Principles; Automation and online monitoring of bulk material handling system.

