



# MINING MACHINERY

## PROF. KHANINDRA PATHAK

Department of Mining Engineering

IIT Kharagpur

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

**INTENDED AUDIENCE :** Undergraduate students of Mining Engineering

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

## COURSE OUTLINE :

Mining Machinery is a core course for undergraduate program in Mining Engineering. This course deals with the basic construction, operation and maintenance aspects of machines used in mining and quarrying industry so that a graduate mining engineer can select the right equipment for specific job under defined geo-mining conditions and provide feed-back for design, application and upkeep of the machines. This course briefly reviews the fundamentals of machinery and covers machinery used in mining for preparing work-site by leveling, grading and compacting ground, for preparing roads, removal of over burden and transporting it to the dumping sites, preparing ground for mineral production, transporting the same to the processing sites. It also covers machines for under underground mining and evacuation of bulk materials with brief introduction of maintenance management aspects.

## ABOUT INSTRUCTOR :

Prof. Khanindra Pathak, 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 Guinea. 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 1:1. Introduction to Mining Machinery

1. Classification of Mining Machinery and characteristics of Machinery
2. Fundamentals of Machinery
  2. Introduction to Machine elements
  3. Mechanical transmission of power in mining machinery
  4. Shafts, pulleys, gears, and gear/trains Bearing and Brakes

### Week 2: 5. Belt drives, chain drives

6. Prime Movers
7. Fluid Power for Mining Machinery
8. Pneumatic Power Machinery

### Week 3: 3. Wire Ropes

9. Steel Wire Rope Types and Design Calculation
10. Steel wire rope maintenance
4. Site and Rock Preparation Equipment
  11. Principle of Rock-Tool Interaction
  12. Dozer and Ripper

### Week 4:13. Drills

14. Scraper
15. Motor Grader
5. Surface Mining Machinery Machinery for Cyclic Excavation
16. Electric Rope Shovel

- Week 5:** 17. Hydraulic Excavators and Back Hoe  
18. Front End Loaders  
19. Hydraulic Excavators and Back Hoe  
Machinery for continuous excavation  
20. Bucket Wheel Excavator
- Week 6:** 21. Bucket Chain Excavator  
22. Continuous Surface Miner  
23. Dredge  
6. Underground Mining Machinery  
24. Loaders: Gathering arm loader, Rocker shovel, LHD, SDL
- Week 7:** 25. Road header  
26. Underground drills and Roof bolter  
27. Continuous Miner  
28. Shuttle cars
- Week 8:** 29. Shearer  
30. surface coal/ore handling plant  
7. Turbo Machinery  
31. Pump, fan and Compressor  
32. mine pumps, pumping ranges, and fittings Fan
- Week 9:** 8. Transportation Machinery for Surface Mines  
33. Off-Highway trucks  
Case Studies  
34. Belt Conveyor  
Exercise and Problem Solving
- Week 10:** 35. Aerial Ropeways  
9. Transportation Machinery for Underground Mines  
36. Rope Haulage Exercise and Problem Solving
- Week 11:** 37. Locomotive  
Exercise and Problem Solving  
38. Introduction to Cage and Skip Winding  
Exercise and Problem Solving
- Week 12:** 39. Low profile dumper  
10. Types of Maintenance and Maintenance Measurements  
40. Introduction to Maintenance Engineering  
Quiz, Review and Interaction