



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Mining Engineering

Subject Code: DI04022071

Subject Name: Mineral Transportation Systems

w. e. f. Academic Year:	2025-26
Semester:	4 th
Category of the Course:	Professional Elective - I

Prerequisite:	Nil
Rationale:	Mineral transportation is a vital link between mineral production at the mine face and its utilization at processing plants, stockyards, or end-users. Since minerals are bulky, heavy, and often produced in large quantities, their movement from mines to consumers forms a major part of the overall mining cost. Hence, knowledge of mineral transportation systems is essential for mining engineers.

Course Outcome:

After Completion of the Course, Student will able to:

No.	Course Outcomes	RBT Level
01	Justify the selection of mine transportation system with their applicability, objective and mode of operation.	U
02	Select best possible surface transport system based on the economic consideration and applicabilities.	U
03	Select best possible underground transport system based on the economic consideration and applicabilities.	U
04	Apply knowledge of modern and sustainable practices in mine transportation with emphasis on safety and environment.	U

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2) C	Assessment Pattern and Marks				Total Marks
L	T	PR		Theory		Tutorial / Practical		
			ESE (E)	PA (M)	PA (I)	ESE (V)		
4	0	0	4	70	30	0	0	100



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction to Mineral Transportation: 1.1 Importance of transportation in mining. 1.2 Objectives of Mineral Transportation 1.3 Stages of Mineral Transportation 1.4 Classification: Surface mine transportation, Underground mine transportation, Mine-to-plant transportation. 1.5 Factors affecting selection of transport system.	09	20
2.	Surface Mine Transportation: 2.1 Introduction to Surface Mine Transportation 2.2 Truck and dumper transportation: types, capacity, operation, advantages & limitations, Selection of truck size based on fleet capacity of shovel 2.3 Rail Transportation 2.4 Belt Conveyor Transportation 2.5 Aerial Ropeway and Pipeline Transport 2.6 Safety precautions in surface transport	15	32
3.	Underground Mine Transportation: 3.1 Types of Underground Transport System: 3.1.1 Track-bound systems: Required traction system and power, Mode of operations, and applicability 3.1.2 Trackless systems: Required traction system and power, Mode of operations, and applicability 3.1.3 Belt conveyor system: Required traction system and power, Mode of operations, and applicability 3.1.4 Armoured Face Conveyor (AFC) system: Required traction system and power, Mode of operations, and applicability 3.1.5 Hydraulic Transportation System: Required traction system and power, Mode of operations, and applicability 3.1.6 Material winding system in shaft: Required traction system and power, Mode of operations, and applicability	12	28



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	3.2 Safety in underground transportation system: General safety requirements, and provisions for each type of underground transportation system		
4.	Modern Trends and Environmental Aspects: 4.1 Modern practices: GPS-based truck dispatch, autonomous trucks (basic awareness). 4.2 Electrification in mine transport. 4.3 Environmental aspects: dust, noise, and vibration from haulage. 4.4 Sustainable practices in mineral transport.	09	20
	Total	45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
20	70	10	0	0	0

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Deshmukh, D.J. Elements of Mining Technology (Volume 1,2&3). Central Techno Publication.
2. Hartman, H.L. Introductory to Mining Engineering. John Wiley & Sons.
3. Tatiya, R.R. Surface and Underground Excavations (2nd Edition). CRC Press

(b) Open-source software and website:

Directorate General of Mines Safety (DGMS)

<https://www.dgms.gov.in/>

1. Indian Bureau of Mines (IBM)

<https://ibm.gov.in/IBMPortal/pages/Functions>

2. Surface Mining Technology (NPTEL)

<https://nptel.ac.in/courses/123/105/123105007/>



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3. Underground Mining of Metalliferous deposits (NPTEL)
<https://archive.nptel.ac.in/courses/123/105/123105006/>
4. Mining Machinery
<https://nptel.ac.in/courses/123105005>

Suggested Project List:

1. Preparation of a model haul road design (showing gradient, width, curves, and drainage).
2. Preparation of a surface ramp showing its technical and safety features.
3. Case study of an opencast mine nearby – preparation of a report on its mineral transportation system.
4. Preparation of a layout diagram of rope haulage system (direct rope/ endless rope/main-and-tail).
5. Working model of mine track haulage.
6. Study of LHD (Load–Haul–Dump) machine working cycle – observation & report.
7. Design of a simple belt conveyor model.
8. Working model of aerial ropeway.

Suggested Activities for Students:

1. Prepare a report on fleet size for a shovel-dumper combination system.
2. Study of safety devices used in conveyor belts.
3. Comparison chart between battery locomotives and diesel locomotives.
4. Safety checklist preparation for underground haulage systems.
5. Give presentation on any relevant topic.
6. Compare transportation cost and safety parameters for any two type of transportation system assuming all the necessities parameters.
