

LESSON PLAN

TH: 1- ELECTRICAL EQUIPMENT IN MINES

DISCIPLINE: MINING ENGINEERING
BY: BHUPEN KUMAR PRADHAN

SEMESTER: 5TH
WEF: 21.07.2026 TO 05.11.2026

Unit	Week	Class	Topics to be covered
I	W1	1	Electrical cables for Mining use: Cables for mining use & General introduction.
		2	Constructional features of high tension and low tension cables.
		3	Armored cables and trailing cables used in mining operations.
	W2	1	Size of cables and their specific industrial/mining uses.
		2	State procedures of cable laying at surface facilities.
		3	Procedures of cable laying in underground roadways and shaft structures.
	W3	1	Cable joint box: Types and constructional details (Mining type).
		2	Installation, jointing procedures, and safety precautions of Cable Joint Boxes.
		3	Review & numerical/practical problems on mining cables and joint boxes.
II	W4	1	Protective Systems: Fuses, Fuse Materials, Rewireable Fuse, and HRC Fuse.
		2	Uses of Fuse; Circuit Breakers: Air Circuit Breaker, Minimum Oil Circuit Breaker (MOCB).
		3	Bulk Oil Circuit Breaker (BOCB), Air Blast Circuit Breaker, and SF6 Circuit Breaker.
	W5	1	Essential qualities of a good protective system.
		2	Types of relays: Plunger type, Induction type, and Directional Over-current relay.
		3	Relay protection: Over-loads relay, No-volt relay, and Latching relay.
	W6	1	Frequency relay and Earth leakage relay in mining networks.
		2	Protection of transformer by differential relay protection scheme.
		3	Remote control circuit and various protective devices of Gate-End Box.
	W7	1	Drill panel: Operation, control circuits, and protective features.
		2	Earthing system in mines: Methods, standards, and safety norms.
		3	Voltage limits in underground mining applications & review of protective systems.
III	W8	1	Transformer: Fundamentals of Transformer, purpose, and Working principle.
		2	EMF equation, voltage/current ratios, and losses in Transformers.
		3	Mining type transformers: Features, construction, and safety provisions.
	W9	1	Industrial drives - Mining type: Starting and running characteristics of D.C. Motors.
		2	Starting and running characteristics of A.C. Motors in mining applications.
		3	Selection criteria of motors for specific mining use (hoists, haulage, pumps, conveyors).
	W10	1	Electric braking used in Mines: Regenerative braking principles & applications.
		2	Magnetic braking principles & applications in mining equipment.
		3	Comparative analysis & review of industrial drives and braking systems in mines.
IV	W11	1	Underground signaling arrangement: Signals and shaft signal systems.
		2	Communication system in underground (U/G) mines: Overview and requirements.
		3	Point to point communication systems in underground mine workings.
	W12	1	Intercom system / Telephone network configuration in mines.
		2	Cordless systems and wireless communication technologies in U/G mines.
		3	Safety standards and intrinsic safety requirements for mine signaling.
	W13	1	Shaft signaling codes, bell signals, and visual indicators.
		2	Fault diagnosis and maintenance of underground signaling networks.
		3	Case studies & practical setups of underground signaling systems.
V	W14	1	Sensors and their applications: Overview of sensors used in mining environment.
		2	Battery locomotive: Construction, electrical layout, and operational features.
		3	Automation with Thyristor control in mining machinery.
	W15	1	Electrical Load Haul Dump (LHD) vehicles: Electrical control & drives.
		2	Electric mine phone: Principles, operation, and safety features.
		3	Comprehensive Revision (Units I-V) & Final Examination Guidance.

Course Outcomes:

CO:1	Describe various types of electrical cables used in Mines.
CO:2	Describe different types of protective system.
CO:3	Explain the principle of Transformer, Industrial drives- Mining type and Electric braking used in Mines.
CO:4	Describe the working of underground signaling arrangements.
CO:5	Explain various types of sensors and their applications.


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Bhupen Kumar Pradhan

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