Course Type	Course Code	Name of Course	L	T	P	Credit
DC	MMC 206	MINE ELECTRICAL TECHNOLOGY	3	1	0	10

Course Objective

The objective of the course is to present an introduction to different electrical machines like a transformer, DC machines, DC motors, three-phase induction motors, mining circuit breakers, earthing practices in mining, power distribution, electrical safety, mine winders, and Indian electricity rules as applied to mines.

Learning Outcomes

Upon successful completion of this course, students will:

- Have a broad understanding of electrical machinery concepts.
- Have a high-level understanding of the construction and operation of various electrical machines.
- have an idea about applications of electrical machines application to mines.
- To have a clear idea about safety guidelines and India Standards related to mines.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**DC MACHINES:** Construction, EMF and Torque equation, starting of DC Motors, Speed Control of DC Motors, Application as mine drives.	7	Understanding of DC machines construction, working and their application in the mining industry.
2	**THREE-PHASE INDUCTION MOTOR:** Construction and types, Principal of operation, Speed-torque characteristics, Starting and Speed control methods.	7	Understanding of three-phase induction motors construction, working and their connections. Also, it provides an idea about the speed control of motors.
3	**Tranformer:** Construction, Theory of operation, Phasor diagram, OC & SC test, Parallel operation, Vector group.	7	Understanding of synchronous motors construction and working and their application in the mining industry.
4	**POWER DISTRIBUTION IN MINES:** General electrical power distribution in U/G and OC mines, Solidly earthed, restricted-neutral, and insulated-neutral systems of power supply. Earth pits, earthing of mobile electrical equipment in mines—mining cable. Electrical power planning for mechanized longwall coalfaces Types of faults in power system, Calculation of symmetrical 3-phase short circuit current	8	Understanding earthing practices in mines, power supply systems in UG coal mines, earthing systems, and earth fault protection schemes.
5	**MINING CIRCUIT BREAKER:** Airblast, Vacuum and SF_6 circuit breaker, Gate-end box, drill panel, Remote control, and interlock circuits for mining-type circuit breakers.	5	Understanding of various circuit breakers, Gate-end box, drill panel, interlocking circuits for circuit breakers used in mines
6	**ELECTRICAL SAFETY:** Principle of flame-proof enclosure, intrinsically safe circuit. Haulage signalling and longwall face signalling systems, Illumination planning for UG coal mines.	4	A comprehensive idea about flame-proof enclosures, intrinsically safe circuits, Zener safety barriers and their applications
7	**POWER ECONOMICS:** Principle of rate-making of electricity, TARIFF, Causes, and disadvantages of low power factor	4	A comprehensive idea about tariff and power factor.

8	**Transmission and Distribution of Electrical power:** Ring and radial distribution system, substation arrangement and design, short transmission line.	7	Understanding of power supply system for mining industry.
9	**MINE WINDER:** Ward-Leonard drive for DC Winder, AC winder with a liquid controller. Electrical braking of winders – Regenerative, Plugging & Dynamic braking. Winder depth and speed indicator. Automatic contrivances – Overspeed, overwind slack rope, and rope slip detector system. Condition-based Maintenance of winder.	5	A comprehensive idea about mine winders, braking, and automatic contrivances
10	Indian electricity rules as applied to mines	2	Understanding of Indian Electricity rules applicable to mines

Text Books

1. The performance and design of alternating machines- MG Say.
2. Electrical Equipment's in Mines - H. Cotton.

Reference Books

1. Theory of alternating current machinery- Alexander S. Langsdorf.
2. Electric Machinery- Fitzgerald, Kingsley, Umans.
3. Electric Machines- P. K. Mukherjee and S. Chakravorti.
4. Electric Machines- Kothari and Nagrath
5. The performance and design of direct current machines- Clayton and Hancock.
6. Coal Mining Practices – I.C.F. Statham.
7. Mine Winders and winding Systems – P. K. Chakrabarty.