Course Type	Course Code	Name of Course	L	T	P	Credit
DC	MMC302	AUTOMATION AND CONTROL IN MINING MACHINERIES	3	0	0	9

Course Objective
The objective of the course is to present an introduction to different automation and control techniques used in mining machineries.

Learning Outcomes
Upon successful completion of this course, students will get knowledge of: pneumatic, hydraulic, and electrical control systems   semiconductor-based power electronic switches used for industrial control devices.   AC/DC converter devices used for various mining drives applications

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Brief introduction about mining industrial processes and their automation and control aspects. Elements of pneumatic, hydraulic and electrical control systems	4	The students will get the basic knowledge of pneumatic, hydraulic and electrical control systems
2	Introduction of Semiconductor Devices: Thyristor, GTO, IGCT, Power BJT, MOSFET and IGBT. Their Triggering methods and applications in mining machines.	6	Knowledge of semiconductor-based power electronic switches used for industrial control device.
3	Concept of AC to DC power conversion: Single phase and three phase controlled rectifier. Application in solid state drives for mining machinery.	5	Knowledge of AC/DC converter devices used for various mining drives applications
4	DC to DC Converter: Buck and Boost converters. Application in mining machinery.	3	Knowledge of DC/DC converter devices used for various mining machines
5	DC to AC Converter: Single phase and three phase inverters operation, Basic concept of PWM control. Application in solid state drives for mining machinery.	5	Knowledge of DC/AC converter devices used for various mining drives applications
6	Fundamentals of process control including Proportional, Integral, Derivative (PID) Control. Control strategies in mining machinery. Implementation of digital controller.	5	To understand the concepts of basic control system
7	Common industrial sensors used in mining machinery: Optical, Inductive, Capacitive, Encoders, Thermocouples.	5	Knowledge of various sensors and its uses in mining machinery
8	Programmable Logic Controller: Configuration and application in mining machinery, Fundamentals of programming including programming of Coils, Relay Contacts, Timers and Counters • Simple Logical Program Development (Ladder diagram).	6	Students will learn the basic operation, programming of PLC used in most of the mining machines control

9	Environment monitoring and communication systems in mines. Data acquisition techniques.	3	To understand the monitoring and communication devices in mines

TEXT BOOKS:

1. Process Control Instrumentation Technology - C. D. Johnson., 8/e, Pearson/Prentice Hall

2. Industrial Electronics: Applications for Programmable Controllers, Instrumentation and Process Control, and Electrical Machines and Motor Control - Thomas E. Kissell, 3/e, Pearson.

REFERENCES:
1. Modern Control Engineering - K. Ogata.
2. Measurement Systems : Application and Design - E. O. Doebelin and D. N. Manik.
3. Transducers and Instrumentation - D. V. S. Murty.
4. Process System Analysis and Control - Coughanowr