

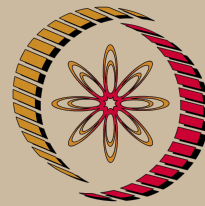
Automation & Controls - Web course

COURSE OUTLINE

Automation and control is an application oriented course that introduces the reader to the basic units used in industry to increase production by enhanced force/power levels or through sensor based control. Electrical, pneumatic and hydraulic prime movers and associated control hardware will be introduced. Relay control systems and PLC systems and their programming will be used to demonstrate control including sequence control.

COURSE DETAIL

Sl. No	Module wise / Lecture wise
1.	Automated systems - Mechanical, Electrical, Pneumatic.
2.	Fluid Power - components, advantages, applications.
3.	Fluid power actuators - cylinders and motors.
4.	Control devices - fluid direction control, pressure control and flow control valves.
5.	Hydraulic circuit design - design considerations, circuit design approach.
6.	Hydraulic/ pneumatic control circuits - single and double acting cylinder control, Regenerative circuit, Pump unloading circuit, double pump hydraulic system, counterbalance valve.
7.	Cylinder synchronizing circuits, Fail safe circuit, two hand safety circuit, Speed control of hydraulic motor.
8.	Hydraulic Pumps - Pumping theory, classification, Type of pumps gear pumps, lobe pump, screw pump, vane pump, and variable displacement pumps, Cavitation problem, pump selection procedure.
9.	Hydraulic circuit analysis - Laminar and turbulent flow, friction losses, Darcy's equation, losses in valves and fittings, Equivalent length technique, numerical problems.
10.	Electro pneumatics - Electrical signals, Signal flow in control system, Comparison between pneumatic and electro-pneumatic control systems, components of electrical signal control, Sensors for displacement and pressure, proximity sensors capacitive, inductive, and optical, pressure sensor, Relays & contactors.



NP-TEL

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Mechanical Engineering

Pre-requisites:

Fluid mechanics, electrical circuits.

Coordinators:

Dr. S. Jha

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11.	Electrically actuated DCVs, Electrical circuit diagrams, symbols, design guidelines, current paths, identification of components, terminal designations of contacts and relays, contact element table, Terminal connection diagram, terminal allocation, terminal allocation list, Wiring electro pneumatic system.
12.	Relay control system - applications in cylinder control, logic operations, signal storage, Relay circuit with latching, cylinder control with latching circuit, sequence control with double solenoid valve, feeding device, design of relay circuit diagram, control elements, sequence control of a lifting device.
13.	Programmable Logic Controllers (PLCs) - introduction, block diagram, PLC operations, Comparison with relays circuit, Ladder diagram, Basic instructions, examples, Level control application, Latch instructions, counters, timers, shift registers.
14.	PLC programming languages - ladder diagram, functional block diagram, instruction list, structured text, common elements of programming languages, variables and data types, functions, function blocks, timers - ON, OFF, PULSE, counters - increment, decrement.