

## 01 – HYDRAULIC & PNEUMATIC CONTROLS

### COURSE CONTENT

**Name of the Course : ELECTRO HYDRAULIC AND PNEUMATIC CONTROLS**

**No. of Week(s) : 2 WEEKS**

**Course Code : 1.01**

#### Theory

- ❖ Multimedia presentation on Hydraulics & Pneumatics.
- ❖ Function and operation of single acting, double acting, Differential cylinders and motors.
- ❖ Function and use of single, double solenoid valves - 4/2, 4/3, pressure switches.
- ❖ Function and use of Pressure Control Valves, Flow control valves.
- ❖ Fundamental circuits most often used in Industrial and mobile hydraulic system.

#### Practical

- ❖ Identification of electro-hydraulic and electro pneumatic components by their schematic symbols.
- ❖ Construction of single, double acting cylinder circuits – Direct & Indirect method.
- ❖ Circuit's construction with the use of Relays, Contactors, Electrical Timers, sensors, limits switches.
- ❖ Construction of Hammer/chisel circuit.
- ❖ Latching Circuits- Dominant ON & Dominant OFF circuits.
- ❖ Construction of electro pneumatic sequential circuit for Bending attachment  $A+(B+C+)(B-C-)A-$
- ❖ Construction of electro hydraulic sequential circuit for press fit components.

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**Name of the Course : PLCs IN HYDRAULIC & PNEUMATIC CONTROL SYSTEMS**

**No.of Week(s) - 2 WEEKS**

**Course Code : 1.02**

#### Theory

- ❖ Multimedia presentation on Hydraulics & Pneumatics
- ❖ Function and use of single, double solenoid valves - 4/2, 4/3, pressure switches.
- ❖ Function and applications of Programmable Logic Controllers.
- ❖ Function and operations of input/output modules in Programmable Logic Controllers.
- ❖ Translating ladder diagrams into standardized rung diagrams compatible with Programmable Logic Controllers programming.
- ❖ Functions, applications and advantages of counters and timers in Programmable Logic Controllers.

#### Practical

- ❖ PLC Programming, executing, running and verifying accuracy of simple programs.
- ❖ Simulation, modifying an existing program and executing and verifying its accuracy.
- ❖ Perform required connections from Programmable Logic Controllers to the input and output devices and verify accuracy of system operation.
- ❖ Construction of Ladder programming for Hammer/chisel, Bending attachment & press fit circuits.

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**Name of the Course : MAINTENANCE of HYDRAULIC AND PNEUMATIC CONTROL SYSTEMS**

**No.of Week(s) - 2 WEEKS**

**Course Code : 1.03**

**Theory**

- ❖ Multimedia presentation on Hydraulics & Pneumatics.
- ❖ Preparation and conditioning of compressed air and its distribution.
- ❖ Read and interpret a variety of schematic drawings.
- ❖ Hydraulic advantage – Mechanical leverage, Multiplication of forces.
- ❖ Hydraulic fluid, seal, Accumulators
- ❖ Preventive maintenance actions.

**Practical**

- ❖ Identification of hydraulic and pneumatic components by their schematic symbols.
- ❖ Troubleshoot common pneumatic components circuits.
- ❖ Prevent hydraulic system contamination.
- ❖ Troubleshooting of Industrial pneumatic and Hydraulic circuits – Shaping Machine, surface grinder.
- ❖ Main failures of the following hydraulic components causes and corrective actions: –  
Pumps– Directional control valves – Pressure control valves – Flow control valves.

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**Name of the Course : OVERHAULING of HYDRAULIC PUMPS & COMPRESSORS**

**No.of Week(s) - 2 WEEKS**

**Course Code : 1.04**

**Theory**

- ❖ Multimedia presentation on Hydraulics & Pneumatics.
- ❖ Hydraulic advantage – Mechanical leverage, Multiplication of forces.
- ❖ Construction and functioning of various types of Compressors
- ❖ Working Principles of various types of Hydraulic Pumps.

**Practical**

- ❖ Dismantling & assembling of hydraulic pumps – Gear, Vane, Piston pumps.
- ❖ Overhauling of 5 ton hydraulic jack.
- ❖ Trouble shooting, dismantling & assembling of Reciprocating Single Stage Compressor.
- ❖ Trouble Shooting, dismantling & assembling of Reciprocating Two Stage Compressor.
- ❖ Trouble shooting, dismantling & assembling of Hydro vane compressor.

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**Name of the Course : MECHATRONICS (HYDRAULICS & PNEUMATICS)**

No.of Week(s) - 2 WEEKS

Course Code : 1.05

**Theory**

- ❖ Mechatronic system Design
- ❖ Multimedia presentation on Hydraulics & Pneumatics.
- ❖ Electro pneumatic control.
- ❖ Sensor Technology & applications.
- ❖ PLC Instruction set.
- ❖ Principles of Hydraulics.
- ❖ Electro Hydraulic circuits.

**Practical**

- ❖ Identification of electro-hydraulic and electro pneumatic components by their schematic symbols.
- ❖ Circuit's construction with the use of Relays, Contactors, Electrical Timers, sensors, limits switches.
- ❖ PLC Programming, executing, running and verifying accuracy of simple programs.
- ❖ Simulation, modifying an existing program and executing and verifying its accuracy
- ❖ Trouble shooting of hydraulic and pneumatic components.

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**Name of the Course : LOW COST AUTOMATION (HYDRAULICS & PNEUMATICS)**

No.of Week(s) - 2 WEEKS

Course Code : 1.06

**Theory**

- ❖ Multimedia presentation on Hydraulics & Pneumatics.
- ❖ Identification of Pneumatic, electro pneumatic components by their schematic symbols.
- ❖ Construction of circuits for pneumatic and electro pneumatic system.
- ❖ Air Logic circuits.
- ❖ Identification of hydraulic, Electro hydraulic components by their schematic symbols.
- ❖ Construction of circuits for hydraulic, electro hydraulic components system.
- ❖ Introduction to PLC – input/output addressing.
- ❖ Ladder diagram – Simple circuit.
- ❖ Preventive maintenance actions.

**Practical**

- ❖ Identification of hydraulic and pneumatic components by their schematic symbols.
- ❖ Construction of single, double acting cylinder circuits – Direct & Indirect method.
- ❖ Circuit's construction with the use of OR, AND, Time Delay, Pressure sequence, Quick exhaust, flow control and Limit switches.
- ❖ Construction of Hammer/chisel circuit, sequential circuit A+B+C+C-B-A-
- ❖ Construction of regenerative circuit.

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**Name of the Course : PNEUMATIC CONTROLS for SUPERVISORS**

**No.of Week(s) - 1 WEEK**

**Course Code : 1.07**

**Theory**

- ❖ Multimedia presentation on Fluid Power.
- ❖ Identification of pneumatic components by their schematic symbols.
- ❖ Compressed Air Theory, production, Purification and Distribution.
- ❖ Air Logic circuits.

**Practical**

- ❖ Construction of pneumatic circuit with direct & indirect control, application of roller limit switches
- ❖ Construction and applications of pressure control valve and flow control valve with accessories.
- ❖ Construction of sequential circuit for A+B+C+C-B-A-

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**Name of the Course : HYDRAULIC & PNEUMATIC CIRCUIT DESIGN USING FLUID SIM SOFTWARE**

**No.of Week(s) - 1 WEEK**

**Course Code : 1.08**

**Theory**

- ❖ Introduction to Pneumatics, Pneumatic Symbol, block diagrams.
- ❖ FLUID SIM menus
- ❖ Identification of Fluid power components by their schematic symbols
- ❖ Component library
- ❖ Introduction to simulating & creating circuits using Fluid sim symbols
- ❖ Construction of pneumatic circuit with direct and indirect control, application of roller limit switches air logic circuits

**Practical**

- ❖ Identification of Pneumatic valves, Components, parts of Air compressor and to draw the symbols.
- ❖ Practical using Fluidsim software
- ❖ Construction of single, double acting cylinder circuits – Direct & Indirect method.
- ❖ Circuit's construction with the use of OR, AND, Time Delay, Pressure sequence, Quick exhaust, flow control and Limit switches.
- ❖ Construction of Hammer/chisel circuit
- ❖ Construction of electro-pneumatic circuits using Latching circuits – Dominant - On, Dominant - Off circuit
- ❖ Construction of hydraulic regenerative circuit.