



COURSE CONTENT

POST GRADUATE IN AUTOMATION & ROBOTICS (PGAR)

Each day: 6hrs, Weekly: 5 days, 48 weeks

Total duration: 1440 hrs

PART-A: - BASIC RELAY BASED CONTROL SYSTEM [50 HRS]

- Brief introduction to Electricity
- Measuring Instruments Details.
- Concept of NO, NC & their Implementation.
- Theories & Practices with Toggle Switch, Push button switch, Limit switch, Selector Switch.
- Relay and Contactor working principle with practical wiring.
- Timer Application Electrical control circuit.

PART-B: - ADVANCED RELAY BASED CONTROL SYSTEM [30 HRS]

- Star-Delta circuit designing & practices with the use of Timer.
- DOL starter
- Rotor resistance control
- Wiring with machining equipment

PART-C: - BASIC PLC [100 HRS]

- Introduction to Programmable Logic Controller.
- History of PLC, PLC Architecture.
- Hardware details of PLC.
- Software details of Indra works Engineering
- PLC Languages with Ladder Logic Details.
- Assignments on NO & NC.
- Application of SET, RESET Coil with SR, RS.
- Global variable declaration
- Application of Timer & Counter in PLC
- Interfacing of PLC with Electrical hardware Components

PART-D: - ADVANCED PLC [110 HRS]

- Application Counter & Comparator in PLC
- Introduction to IEC based operators.
- Design & concept of Visualization
- Programming using analog inputs & outputs
- Concept PLC Networking using various topology
- PLC Programming in IL & FBD



PART-E - INDUSTRIAL PLC [110 HRS]

- PLC Programming in SFC language
- PLC Programming in CFC language
- PLC Programming in ST language
- Introduction to HMI & its application in industry
- Concept of HMI programming
- Alarm, Trend, Oscilloscope operation in PLC
- Troubleshooting technique in PLC programming & interfacing
- Safety & Maintenance of PLC
- Quiz & Seminar on Topics covered.

PART-F: - BASIC SENSORICS [20 HRS]

- Introduction to Sensorics
- Principle & operation of Inductive, Capacitive, Photo-electric, Ultrasonic & Magnetic sensors
- Behavior testing of different sensors

PART-G: - ADVANCED SENSORICS [40 HRS]

- Operating range & Hysteresis of different sensors
- Concept of Reduction factor & detection of reduction factor for all sensors
- Automatic Forward & Reverse of a stepper motor using sensors

PART-H: - INDUSTRIAL SENSORICS [20 HRS]

- Detection of switching frequency of inductive sensor
- Detection of thickness of object with capacitive sensor
- Level control with Ultrasonic sensor
- Detection of groove at a work piece

PART-I: - BASIC MECHATRONICS [100 HRS]

- Introduction to modular Mechatronics System
- Electrical, Pneumatic, Hydraulic drive interfacing in mMS
- PL C networking with Master/Slave concept
- Hands on practice with Magazine station of mMS

PART-J: - ADVANCED MECHATRONICS [70 HRS]

- Working with multi project POU
- Project work with all 4 stations
- Troubleshooting & maintenance
- Simulation through software



PART-K: - BASIC ROBOTICS) [30 HRS]

- Introduction to Robotics, Types of Robots and Applications
- Robot Power Transmission Systems.
- Components of CMS Robot
- Determination of Workspace limitation of Robotic kit.
- CMS instructions and Operation through VCP.
- Information regarding Teach
- Robotic programming through VCP.
- Simple axis-movement program via VC
- Movement program with MOVE, Output Set/Reset.
- Movement program with abortion of movement.
- Movement program with rounding of the 90 degree turn.
- Set output & WAIT for an input before movement is continued.

PART-L: - INDUSTRIAL ROBOTICS [40 HRS]

- Advanced robot programming
- Robot communication & interfacing with other artificial intelligence
- Concept of safety precaution of Robotics system
- Introduction to Servo application in robotics

PART-M: - ELECTRICAL DRIVES (VFD) [40 HRS]

- Concept of Transfer system & Identification of different parts of TS
- Trouble shooting & operation of Transfer system
- Commissioning of FCS01 VFD
- Parameterization of VFD for different operation like Ramp up & Ramp down, Start & Stop, etc.

PART-N: - BASIC PNEUMATICS [70 HRS]

- Introduction to Pneumatic Technology.
- Difference between Hydraulics & Pneumatics Control.
- Advantage & Disadvantages of Pneumatics Technology.
- Application of Pneumatics Technology in Automation.
- Types of Directional control valves & their Implementation.
- Theories & Hands on practices on Shuttle valve, Twin pressure valve, Time delay valve.
- Theories & Experiments on Flow control valve.
- Practices of Pneumatic circuits in Simulation Software.



PART-O: - ADVANCE PNEUMATICS [70 HRS]

- Theory & practice of some Special valve operation
- Sequential control, Time dependent control, Displacement dependent control
- Troubleshooting and maintenance of pneumatic system
- Reflex nozzle & Pneumatic amplifier
- Pneumatic calculation and implementation
- Selection of components for specific work

PART-P: - INDUSTRIAL PNEUMATICS [50 HRS]

- Theory & practice of Reflex nozzle & Pneumatic amplifier
- Pneumatic calculation and implementation
- Selection of components for specific work

PART-Q: - BASIC ELECTRO-PNEUMATICS [40 HRS]

- Introduction to Electro-Pneumatics.
- Details of Reed Switch & Sensor (Inductive, Capacitive, Optical Sensor).
- Practices with 3/2 solenoid valve, 5/2 Solenoid valve & 5/3 Solenoid valve.

PART-R: - ADVANCE ELECTRO-PNEUMATICS [40 HRS]

- PLC interfacing with Pneumatics system.
- Application of various sensors in pneumatic actuators
- Design of project based on Pneumatic drives

PART-S: - BASIC HYDRAULICS [70 HRS]

- Applications of Hydraulic Technology in industrial Automation.
- Advantages & Disadvantages of Hydraulic System.
- Theories & Hands on practices of Various Directional & Pressure control Valves.
- Theories & Hands on practices of Flow control Valves, Various Actuators.
- Detailed discussion on Hydraulics Symbols Simulation Software.

PART-T: - ADVANCED HYDRAULICS [50 HRS]

- Machine designing by using Hydraulic system
- Accumulator, Dual pressure setting components
- CONCEPT OF Hydraulic motor

PART-U: - INDUSTRIAL HYDRAULICS [50 HRS]

- Pressure Vs Time analysis
- Troubleshooting & Maintenance OF Hydraulics system
- Practice & Circuit building through Automation Studio software



PART-V: - BASIC ELECTRO-HYDRAULICS [30 HRS]

- Introduction to Electro-Hydraulics.
- Design of Electro-Hydraulics circuit with Hardware & software.
- Practices with 4/2 solenoid valve, 4/3 Solenoid valve.

PART-W: - ADVANCED ELECTRO-HYDRAULICS [50 HRS]

- Different sensor interfacing with Electro-hydraulics
- PLC interfacing with different directional control valve
- Displacement dependent, Time dependent, Sequential control of Electro-hydraulic system

PART-X: - BASIC PROPORTIONAL HYDRAULICS [30 HRS]

- Introduction to Proportional Technology and its significance in close loop control.
- Description of Proportional Valve architecture.
- Experiments with Proportional Valve.

PART-Y: - ADVANCED PROPORTIONAL HYDRAULICS [50 HRS]

- PLC interfacing with proportional valve
- Application of various sensors using proportional valve
- Troubleshooting & Maintenance of proportional valve & its components

PART-Z: - MOBILE HYDRAULICS [80 HRS]

- Introduction to Mobile Hydraulics and its applications.
- Experiment with Mobile Hydraulic Valve.
- Controlling of multiple actuators through joystick of the mobile valve.
- Controlling pressure, speed and direction of the actuator by using mobile valve.