**Syllabus :** PLC I/O addressing, PLC programming instructions : Relay type instructions, Timer instructions : On delay, Off delay, Retentive, Counter instructions, Up, Down, High speed, Logical instructions, Comparison instructions, Data handling instructions, Arithmetic instructions, PLC programming language - Functional Block Diagram (FBD), Instruction list,, Structured text, Sequential Function Chart (SFC), Ladder programming, Simple programming examples using ladder logic : Language based on relay timer counter logical, Comparison, Arithmetic and data handling instructions, PLC based applications : Motor sequence control,, Traffic light control, Elevator control, Tank level control, Conveyor system, Stepper motor control, Reactor control.

**Unit-IV**

**Chapter 4 : Electric Drives & Special Machines**

**4-1 to 4-52**

**Syllabus :** Electric drives : Types, Functions, Characteristics, Four quadrant operation, DC and AC drive controls : V/F control, Parameters, Direct torque control, Drives : Working principle, Specifications, Parameters, Types and applications, Applications - Speed control of AC motor / DC motor.

**Unit–V**



**Syllabus :** Introduction to SCADA, Typical SCADA architecture / block diagram, Benefits of SCADA, Various editors of SCADA, Interfacing SCADA system with PLC : Typical connection diagram, Object linking and embedding for Process Control (OPC) architecture, Steps in creating SCADA screen for simple object, Steps for linking SCADA object (defining tags and items) with PLC ladder program using OPC, Applications of SCADA : Traffic light control, Water distribution, Pipeline control.



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