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33071- CONTROL OF ELECTRICAL MACHINES

DETAILED SYLLABUS

OBJECTIVES

To understand

- Electrical control circuit elements including various types of industrial switches, relays, timers, solenoids, contactors and interlocking arrangement.
- AC motor control circuits for acceleration control, speed control, direction control, braking control and jogging using contactors.
- Different control circuits for industrial applications.
- Basics of programmable logic controller.
- PLC Programming.

UNIT- I CONTROL CIRCUIT COMPONENTS

Switches – Push button, selector, drum, limit, pressure, temperature (Thermostat), float, zero speed and proximity switches. Relays – Voltage relay, DC series current relay, frequency response relay, latching relay and phase failure relay (single phasing preventer). Over current relay – Bimetallic thermal over load relay and Magnetic dash pot oil filled relay. Timer – Thermal Pneumatic and Electronic timer. Solenoid Valve, Solenoid type contactor (Air break contactor), Solid state relay, Simple ON-OFF motor control circuit, Remote control operation and interlocking of drives.

UNIT- II AC MOTOR CONTROL CIRCUITS

Motor current at start and during acceleration – No load speed and final speed of motor – DOL starter – Automatic auto transformer starter (open circuit and closed circuit transition) – Star/Delta starter (semi automatic and automatic) – Starter for two speed two winding motor – Reversing the direction of rotation of induction motor – Dynamic Braking – Three step rotor resistance starter for wound induction motor – Secondary frequency acceleration starter.

UNIT- III INDUSTRIAL CONTROL CIRCUITS

Planner machine control – Skip hoist control – Automatic control of a water pump – Control of electric oven – Control of air compressor – Control of over head crane – control of conveyor system – Control of elevator - Trouble spots in control circuits – General procedure for trouble shooting.

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UNIT- IV PROGRAMMABLE LOGIC CONTROLLER

Automation – Types of automation (manufacturing and nonmanufacturing) – advantages of automation –PLC Introduction – Block diagram of PLC – principle of operation – modes of operation – PLC scan – memory organization – input module (schematic and wiring diagram) – output module (schematic and wiring diagram) – Types of Programming Devices – Comparison between hardwire control system and PLC System –PLC Types (Fixed and Modular) – Input Types – Output Types – Criteria for selection of suitable PLC – List of various PLCs available.

UNIT- V PLC PROGRAMMING

Different programming languages – ladder diagram – Relay type instruction – Timer instruction – ON delay and OFF delay Timer – Retentive Timer Instruction – Cascading Timers – Counter Instruction – UP Counter – Down Counter – UP/DOWN Counter - ladder logic diagram for DOL Starter, Automatic STAR-DELTA Starter -rotor resistance starter and EB to Generator changeover system.

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