

**DETAILED SYLLABUS**

**Unit I DC CIRCUITS AND DC MACHINES**

Definition Electric current, voltage and resistance Ohm's law and Kirchhoff's law. Resistance in series and parallel and series, parallel – simple problems electro magnetism (definitions only) – magnetic flux, flux density magnetic field intensity, MMF, permeability, reluctance, Faraday's law of electromagnetic induction, electrical and mechanical units

DC generators – construction, principle of operation, types and application.

DC motors: - construction, principle of operation, types and application. Necessity of starters: Three point, four point starters.

**Unit II AC CIRCUITS AND AC MACHINES**

Fundamentals of AC voltage, and current – peak, average, RMS value of sine wave, frequency, time period, amplitude, power and power factor (definition only)- star and delta connection relationship between phase, line voltage and current in star and delta connections.

Transformer: Principle of operation and construction – EMF equation (no definition)- losses in Transformer – efficiency – application. Alternator construction – principle of operation – types and applications.

AC machine: AC motors- Principle of operation of single phase capacitor start and universal motor induction motor- applications- Three phase induction motors – Squirrel cage and slip ring Induction motors (construction and working principle only) - application – speed control of 3 $\Phi$  Induction motor -Necessity of starters – DOL and star/delta starter.

**Unit III STEPPER AND SERVO MOTORS & DRIVES**

PMDC, Stepper motor- construction and working principle and applications - Servo motor – types: brushless servo motor, permanent magnet servo motor construction and applications.

Industrial drives- types, group drive, individual drive, multi motor drive, block diagram of Variable frequency drive, stepper motor drive: single stepping and half stepping. Servo drives.

Electrical safety: - importance of earthing - electric shock: first aid, precautions - causes of accident and their preventive measures. Energy conservation

**Unit IV POWER SUPPLIES AND LOGIC GATES**

## For Notes, Syllabus, Question Papers and Many more

Diode – terminals: anode and cathode, forward biasing and reverse biasing – use of diode in rectifiers – half wave and full wave – necessity of filters- Regulated power supplies: IC voltage regulators – SMPS, UPS and Inverters – General description and their applications.

Display devices – LED, 7 segment LED, LCD Logic gates: Positive and negative logic, definition, symbol truth table, Boolean expression for OR, AND, NOT, NOR, NAND, EXOR AND EXNOR gates – Universal logic Gates: NAND, and NOR.

### **Unit V CONTROL ELEMENTS AND PLC**

Fuses selection of fuse necessity of fuse switch units. Sensors: Photo electric sensor, Inductive proximity sensors, Temperature sensors.

Switches: Push button switch, selector switch, limit switch, pressure switch, temperature switch, float switch and reed switch. Relays – NO, NC – usage- bimetallic thermal overload relays. Contactors- usage – necessity of contactor- Solenoid type contactor Circuit breakers – Miniature case Circuit breaker (MCCB) and Miniature Circuit breaker (MCB), Oil Circuit breakers (OCB), Earth leakage circuit breaker (ELCB) Features of PLC-PLC Block diagram- PLC scan - Fixed and modular PLC Ladder logic-NO, NC contacts-Coils-AND, OR.

#### **Text Books:**

- 1) A course in electrical engineering - B.L.Theraja - Multi Colour Edition, S Chand & Co, Reprint 2006
- 2) Control of Machines - S.K Bhattacharya, Brijinder Singh – New Age Publishers, Second Edition- Reprint 2010
- 3) Electronic Circuits & System- Analog and Digital – Y.N.Bapat - Tata Mc Graw Hill.

#### **Reference Books:**

- 1) Electrical Technology – Hughes - 8th Edition, Pearson Education.
- 2) Electronic Device and Circuits- An introduction – Allen Mottershed - Prentice Hall of India.