

Paper-I
ELECTRICAL ENGINEERING
(Diploma Standard)

CODE No:203

UNIT-I: CIRCUIT THEORY AND DC MACHINES

Electrostatics - Fundamentals of electric circuits - DC Circuits - Network Theorems (Simple problems in DC) - Single phase AC and 3 phase AC circuits – Resonant circuits- Electro magnetism - DC Generator - Types - construction - working - characteristic curves - Armature reaction- application. DC Motor - Types - construction - working - characteristics - commutation - application - speed control – D.C Starters – Maintenance of DC machines – Storage batteries.

UNIT-II: A.C. MACHINES AND SPECIAL MACHINES

Single phase transformer - construction - EMF equation - OC & SC Test - Regulation and efficiency- parallel operation. Three phase transformer – construction– Testing -Parallel operation – Maintenance Alternator - construction - EMF equation - methods of obtaining sine-wave - parallel operation – Testing– Determination of voltage regulation. Synchronous Motor - construction - starting methods - application. 3 phase induction motor - construction and working principle - phasor diagram - starters - speed control - maintenance. Single phase induction motors - working principle – types- applications - Special machines - PMSM, SRM, Stepper motor, PMSLDC motors.

UNIT-III: MEASUREMENTS AND INSTRUMENTS

Classification and characteristics of instruments - operating forces– construction and working of M.I., MC and Dynamometer type instruments – Instrument transformers- Direct measurement of current, voltage and resistance- Measurement of Power – Measurement of energy- single phase and 3 phase Energy meters. Measurement of power factor - Maximum demand indicator - Synchroscope- Measurement of frequency - AC Bridges - Anderson bridge - Schering bridge- Cathode ray Oscilloscope – Sensing elements - Transducers – Passive, active transducers.

UNIT-IV. ELECTRONIC DEVICES AND CIRCUITS

Semi conductor Diodes –Rectifiers – Half wave, full wave and Bridge rectifier- Filters- 3 phase rectifiers - Bipolar junction Transistors (BJT) – biasing – configuration - Field effect Transistors (JFET & MOSFET) and Uni junction Transistor (UJT) – Transistor oscillators - Special semiconductor devices - Gunn diode, varactor diode, Zener diode, Tunnel diode - Silicon controlled Rectifier - DIAC- TRIAC –IGBT –Opto electronic devices – LDR, LED, LCD, Opto coupler, IR transmitter and receiver, Laser diode , Solar cell, Photo diode, Photo transistor – Diode clipper – Diode clamper –Voltage doubler - Multi vibrators -Astable, Monostable, Bistable – Schmitt trigger.

UNIT-V: ANALOG AND DIGITAL ELECTRONICS

Operational amplifiers - characteristics – applications - Number system- Boolean algebra- De-Morgan's theorems - Logic gates- Digital logic families- Combinational circuits - Sequential circuits – Flipflops, Counters, shift registers – Memory devices - D / A and A / D converters.

UNIT-VI: GENERATION, TRANSMISSION AND SWITCH GEAR

Generation of electrical energy – Inter connected system – Load curves and load duration curves–Tariff -Economics of power generation - Fuel cells – AC transmission - voltage regulation and transmission efficiency - Sag – HVDC transmission - Line Insulators and Underground cables- Cable faults –Murray loop test for cable fault detection -Circuit breakers - Lightning arrestors - Fuses - HRC fuse – Protective relays - Grounding.

UNIT-VII: DISTRIBUTION AND UTILISATION

AC and DC Distribution - Substations – Busbar system - Industrial Drives - Types of electric drives and choice of electric motor. Electric Traction –System of track electrification -Traction mechanics - Traction motors and control – Magnetic levitation. Illumination - Laws of illumination –Lighting systems - construction and characteristics of Arc, incandescent, Sodium vapour, Mercury vapour CFL and LED lamps. Electric heating – Electric furnaces – Electric welding - Electric welding equipments.

UNIT-VIII: MICRO PROCESSOR AND MICRO CONTROLLER

Introduction to microprocessors - 8085 micro processor - Architecture – Instruction set – Addressing mode – Instruction cycle.

8051 micro controller – Architecture – Instruction set – Assembler - Addressing modes - Programmes – I/O programming – Timer programming- Serial communication – Interrupts- IC 8255 - Peripheral interfacing techniques with 8051 – Applications.

UNIT-IX:

A. POWER ELECTRONICS AND DRIVES

Thyristor family- SCR trigger circuits – Commutation circuits- Phase controlled rectifier – Choppers – Inverters – SMPS –UPS – Control of DC drives – Four quadrant control of DC motor - Control of AC drives.

B. ELECTRICAL ESTIMATION & ENERGY AUDITING

Indian Electricity Rules – 1956 - Standard symbols for various wiring items, accessories - Wiring systems – wire size – Selection of fuses - Earthing- Testing of installations - Domestic, commercial and industrial installation estimate – Energy auditing- Energy conservation – Selection of cable – Lighting systems – Pumping systems.

UNIT-X: CONTROL OF ELECTRICAL MACHINES

Control circuit components –Switches, relays, timers, contactors – DC motor control circuits- Jogging, dynamic braking, plugging, reversing control circuit- speed control using UJT& SCR – AC motor control circuits- DOL starter, Auto transformer starter, Star-delta starter – Rotor resistance starter – plugging –dynamic braking – Industrial control circuits - Programmable logic controller – Components of PLC - Inputmodule – output module - programming – Ladder diagram for DOL, star- delta starter.