

ELECTRICAL ENGINEERING (CODE NO. 10)

1. Circuit Analysis

Circuit Components, network graphs, KCL, KVL, Circuit analysis methods, basic network theorems, Transient Analysis of RL, RC and RLC circuit, coupled circuits Sinusoidal Steady State analysis, resonant circuit, Balanced Three phase circuit, Laplace transform & Fourier series analysis. Two port network, driving point and transfer function, poles and zeros of network functions.

2. Electromechanical Energy Conversion

Single phase Transformer, Equivalent circuit, Phasor diagram, tests, regulation & efficiency, Three phase Transformer, Auto Transformer DC generators & motors; Performance Characteristics, Starting & Speed Control, armature reaction and Commutation. Three Phase induction motor; Performance Characteristics, Starting & Speed Control. Single Phase induction motor, Synchronous Generator: performance Characteristics, regulation, Parallel operation. Synchronous motor; Starting Characteristics, applications, Synchronous Condensers, FHP motors, Permanent magnet and Stepper motors, brushless DC motors.

3. Power Systems Analysis & Protection

Transmission line parameters, models, performance of overhead transmission lines, per unit quantities, bus admittance and impedance matrices, load flow analysis, series & shunt compensation, Economic operation, Power system Stability, Symmetrical Components, short circuit studies, HVDC Transmission its merits & demerits. Fault analysis, Relays & Circuit Breakers and their characteristics. Protection schemes for generator, transformer & feeders. Surge protection & insulation co-ordination.

4. Control Systems

Open loop and closed loop Control Systems, Time domain and frequency domain analysis, Stability : Routh Hurwitz Criterion, root loci, Nyquist criterion, Bode plots, P, PI & PID Controllers. Design of lead lag compensators.

5. Power Electronics & Industrial Drives

Solid State Devices : Diode transistors, Triac, GTO and MOSFET : Static Characteristic, Principle of Operation, Triggering Circuit, Controlled rectifiers, Bridge Converters (Fully & half Controlled), Principles of Thyristor chopper & inverter. Basic Concept of Control of drives involving ac and dc motors.

6. Measurement and Instrumentation

Various analog type Indicating instruments, Measurement of Current, Voltage, Power, Power factor, Energy, resistance, inductance capacitance and frequency, Electronic Measuring instruments : Multimeter, CRO, digital voltmeter, frequency counter, Q-meter, digital energy meter. Transducers: Strain gauge, LVDT, Piezo-electric crystals, thermocouples & thermistors.

7. Microprocessors & Computers

8 bit microprocessor 8085 : architecture, instruction set, timing diagram, addressing modes, assembly language programming, memory & I/O interfacing. Computer organization : number representation, functional organization, ALU.

8. Analog and Digital Electronics

Diode Circuits, rectifiers, clipping and clamping, zener diode and voltage regulators, BJT, JFET and MOSFET; Characteristics, biasing and small signal equivalent Circuit (for small & large signals), Amplifiers : Amplifier circuits Analysis, OPAMP circuit, filters, oscillators, Boolean algebra and logic gates. Combinational & Sequential circuits, Registers & Counters.

9. Electro Magnetic Field

Potential & Electric field intensity, their calculation for different charge distribution. Calculation of capacitance & inductance, Ampere's law and Maxwell's equations.