SYLLABUS

Syllabus for Electrical Branch

Section-A (80 Marks) :

1. Electric Circuits:

Network graph, KCL, KVL, node and mesh analysis, star/ delta transformation; electromagnetic induction; mutual induction; ac fundamentals; harmonics, transient response of dc and ac networks; sinusoidal steady-state analysis, resonance, ideal current and voltage sources, Thevening, Nortong, Superposition and Maximum Power Transfer theorems, two-port networks, three phase circuits, power measurement.

2. Electrical Machines:

Single phase transformer - equivalent circuit, phasor diagram, tests, regulation and efficiency; three phase transformers - connections, parallel operation; auto-transformer; Insulation materials; DC machines - types, windings, generator/ motor characteristics, armature reaction and commutation, starting and speed control of motors; three phase induction motors - principles, types, performance characteristics, starting and speed control; single phase induction motors; synchronous machines - performance, regulation and motor starting, characteristics and applications;.

3. Power Systems:

Basic power generation concepts; transmission line models and performance; system stability concepts, swing curves and equal area criterion; underground cable, string insulators; corona; distribution systems; per-unit quantities; bus impedance and admittance matrices; load flow; voltage control; power factor correction; economic operation; symmetrical components; fault analysis.

4. **Switchgear Equipment & Protection:**

Principles of over-current, differential and distance protection; Power Transformer and its Accessories; System Protection Relays viz Bucholz Relays etc.; protection of transformers; EHT Transmission lines; Neutral Earthing; solid state relays and digital protection; circuit breakers; Protection for Transformers, feeder and Busbars, Grounding, Protection against Over Voltages; Batteries and Battery chargers; Capacitor Banks; Reactors in EHT Lines; Insulation materials; Testing Methods *of Equipment.*

5. Utilization & Control Systems:

Principles of feedback; transfer function; block diagrams; steady-state errors; Routh and Nyquist techniques; Bode plots; root loci; lag, lead and lead-lag compensation; Heating - resistance, induction, dielectric; Welding . spot, seam and butt; Electric traction . speed-time curves, tractive effort.

6. Measurements:

Bridges and potentiometers; PMMC, moving iron, dynamometer and induction type instruments; measurement of voltage, current, power, energy and power factor; instrument transformers; digital voltmeters and multi-meters; phase, time and frequency measurement; Q-meters; oscilloscopes; error analysis.

7. Analog and Digital Electronics:

Characteristics of diodes, BJT, FET; amplifiers - biasing, equivalent circuit and frequency response; oscillators and feedback amplifiers; Combinational and sequential logic circuits; multiplexer; Schmitt trigger; A/D and D/A converters; 8-bit microprocessor basics, architecture, programming and interfacing.

8. Power Electronics and Drives:

Semiconductor power diodes, transistors, thyristors, triacs, GTOs, MOSFETs and IGBTs - static characteristics and principles of operation; triggering circuits; phase control rectifiers; bridge converters - fully controlled and half controlled; principles of choppers and inverters; basic concepts of adjustable speed dc and ac drives.

9. Non-Conventional Energy: Solar,Wind and Bio-mass.

Syllabus for Civil Branch

Section-A (80 Marks) :

1. Strength of Materials:

Simple stresses and strains. Hook's law. Stress-strain curve for mild steel, elastic constants, compound bars, temperature stresses, strain energy, resilience, impact loading, SFD and BMD for simply supported, cantilever and overhanging beams. Centre of gravity and moment of inertia, bending and shear stress distributions. Theory of pure torsion, helical spring, thin and thick cylinders, analysis of trusses by method of joints and method of sections, combined direct and bending stresses, column and struts, deflection of beams-double integration, moment area and conjugate beam methods.

2. Reinforced Concrete:

Basic reinforcing materials, tests on cement and aggregates. Structural concrete and its grades, workability tests and concrete mix design. Singly and doubly reinforced beams, working stress design of rectangular and flanged beams, shear, bond, development length and torsion in beams, one-way and two-way slabs, axially and eccentrically loaded columns, isolated and combined footings. Basic concepts of limit state design and its applications to the design of beams, slabs and columns.

3. Steel Structures:

Grades of steels, design of simple and compound beams, riveted and welded joints, riveted and welded connections-eccentric framed and seated, simple and compound columns, slab and gusseted bases, grillage foundations, roof trusses, plastic analysis . plastic bending of beams, shape factor, plastic analysis theorems, and analysis of fixed, propped cantilever beams by static and kinematics methods.

4. Fluid Mechanics & Machinery :

Fluid properties, pressure measurements, manometers, forces on plane and curved surfaces, center of pressure, principle of buoyancy, stability of floating and submerged bodies, metacentre, Kinematics of fluid flow, equation of continuity. Euler's and Bernoulli's equations, Impulse-momentum, flow measuring devices . orifices and mouth pieces, notches and weirs, flow through pipes, open channel flow, impact of jets . stationery and moving vanes (flat and curved), radial vanes, hydraulic turbines, pumps and machinery.

5. Soil Mechanics:

Physical properties of soils, classification and identification, permeability, capillarity, seepage, compaction, shear strength, Earth pressure, slope stability.

Foundation Engineering : Stress distribution in soils, bearing capacity, settlement analysis, pile foundation, Coffer dams, Caissons, Dewatering, Bracing for excavations, site investigations, New mark charts, Machine foundation.

6. Building Materials And Construction:

Bricks. Types of Bricks, Indian standard classification, properties; Stones . Types of stones, classification, properties, dressing and polishing of stones; Methods of Quarrying; Cement . Different grades and types of cement, properties and IS specifications; Aggregates . coarse and fine aggregate, properties and IS specifications; Cement Mortar . Proportions of cement mortar for various applications; Concrete . Constituents of Concrete, Different grades of Concrete, mix proportioning using IS Code, Properties of fresh and hardened Concrete; Admixtures . Types of Admixtures

7. Estimation, Costing and Construction Management:

Abstract estimate: Detailed estimate . centerline, long & short wall method, various items of Civil Engineering works as per Indian Standard, General Specifications - Earth Work, Brick / Stone Masonry in Cement Mortar, RCC, Plastering in Cement Mortar, Floor finishes, white wash, colour wash; Standard schedule of rates, lead and lift, preparation of lead statement; Computation of earth work . Mid-ordinate, Mean Sectional area, Trepezoidal method, Prismoidal Rule; Approximate estimate . Plinth area and cubic rate estimate.

8. Surveying:

Principles and classification of surveying, chain surveying; Compass surveying; Levelling and contouring; Theodolite surveying; curves; Introduction and Fundamental concepts of electronic measuring instruments . EDM, Total station, GIS & GPS.

9. Basic Electrical Engineering:

Electrical Circuits-Basics, Ohms Law, Kirchhoff Law, Inductive & Capacitive networks, Series & Parallel Circuits, Star & Delta Transformers, Instruments-Basic Principals of indicating instruments, PMMC & Moving Iron Instruments, DC Machines-DC Generator, DC Motors and their applications, Transformers-Operation, EMF Equation, Losses, Efficiency & Regulation, AC Machines-Operation of Synchronous and Induction motors, their characterstics & applications.

General Awareness and Numerical Ability :

Section-B (Common to all Streams) : Total 20 Marks.

- i)   Analytical & Numerical Ability
- ii)   General Awareness
- iii)   English
- iv)   Related to Telangana Culture & Movement
- v)   Computer Knowledge.