

Sr. No. 1

**SYLLABUS FOR AE/ ELECTRICAL**

**Electrical Engineering**

**Electric Circuits and Fields:**

Network graph, KCL, KVL, node and mesh analysis, transient response of dc and ac networks; sinusoidal steady-state analysis, resonance, basic filter concepts; ideal current and voltage sources, Thevenin's Norton's and Superposition and Maximum Power Transfer theorems, two-port networks, three phase circuits; Gauss Theorem, electric field and potential due to point, line, plane and spherical charge distributions; Ampere's and Biot-Savart's laws; inductance; dielectrics capacitance.

**Signals and Systems:**

Representation of continuous and discrete-time signals; shifting and scaling operations; linear, time-invariant and causal systems; Fourier series representation of continuous periodic signals; sampling theorem; Fourier, Laplace and Z transforms.

**Electrical Machines:**

Single phase transformer-equivalent circuit, phasor diagram, tests, regulation and efficiency; three phase transformers-connections, parallel operation; auto-transformer; energy conversion principles; DC machines-types, windings, generator 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 parallel operation of generators, motor starting, characteristics and application; servo and stepper motors.

**Power Systems:**

Basic power generation concepts; transmission line models and performance; cable performance, insulation; corona and radio interference; distribution systems; per-unit quantities; bus impedance and admittance matrices; load flow; voltage control; power factor correction; economic operation; symmetrical components; fault analysis; principles of over-current, differential and distance protection; solid state relays and digital protection; circuit breakers; system stability concepts, swing curves and equal area criterion; HVDC transmission and FACTS concepts.

**Control Systems:**

Principles of feedback; transfer function; block diagrams; steady-state errors; Routh and Niquist techniques; Bode plots; root loci; lag, lead and lead-lag compensation; stage space model; state transition matrix, controllability and observability.

AE Electrical

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**Electrical and Electronic Measurement:**

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 multimeters; phase, time and frequency measurement; Q-meters; oscilloscopes; potentiometric recorders; error analysis.

**Analog and Digital Electronics:**

Characteristics of diodes, BJT, FET; amplifiers-biasing, equivalent circuit and frequency response; oscillators and feedback amplifiers; operational amplifiers-characteristics and application; simple active filters; VCOs and timers; combinational and sequential logic circuits; multiplexer; Schmitt trigger; multi-vibrators; sample and hold circuits; A/D and D/A converters; 8-bit microprocessor basics, architecture, programming and interfacing.

**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; basis concepts of adjustable speed dc and ac drives.

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