

Electro-Technical Officer (ETO)

Entrance Exam



SYLLABUS

Total Marks: 100

Duration: 120 minutes

Type : On-line Objective

Level of the Test: Degree level (Electrical and Electronics)

S.NO	SUBJECT
1	General <ul style="list-style-type: none">• Concept of Electricity-generation, Transmission, Distribution and utilization, Electronics and communication.
2	Principle of direct and alternating current and circuits <ul style="list-style-type: none">• Production of direct and alternating current, concept of frequency and wave form, instantaneous maximum and average values, form factor for sinusoidal wave. Concept of phase and phase difference.• Re-presentation of alternating quantities by phasors. D.C. and A.C. Circuits, concept of resistance, inductance, capacitance. Power and power factor. Alternating voltage applied to resistance and inductance in series and RLC series/parallel circuits, practical importance of power factor. Simple problems on A.C. Circuits. Concept of three phase system, star delta connection, voltage and current relationship. Simple problems.
3	Electronics <ul style="list-style-type: none">• Principle of working of electronic rectifier, full wave and half wave, rectifiers, coarse and fine controls, relationship between D.C. output and A.C. input voltage, ripple, effect of capacitor/inductor input filters on the ripple, voltage stabilization by Zener diode.
4	Batteries <ul style="list-style-type: none">• Arrangement of cells, construction of lead acid batteries and S.M.F. batteries, Ampere hour and watt. hour efficiency, simple problems. Battery charging and necessary precautions.
5	Measuring Instruments <ul style="list-style-type: none">• Electrical properties and instruments for their measurement. Working principles and construction of following measuring instruments including their errors and accuracy. Simple problems Ammeters, volt meters (moving coil and moving iron type) different between volt meter and Ammeter. Extension of range of A.C. & D.C. instruments. Watt meters and energy Meter. Difference between watt meter and energy meter. Use of multi-meter, ohm meter, megger, earth tester etc.
6	Air-conditioning <ul style="list-style-type: none">• Principle of A.C., Refrigerating, Refrigeration components and controls.
7	Electric Circuits and Fields <ul style="list-style-type: none">• 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.

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8	Signals and Systems <ul style="list-style-type: none">Representation of continuous and discrete-time signals; shifting and scaling operations; linear, time-invariant and casual systems; Fourier series representation of continuous periodic signals; sampling theorem; Fourier, Laplace and Z transforms.
9	Electrical Machines <ul style="list-style-type: none">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 applications; servo and stepper motors.
10	Power Systems <ul style="list-style-type: none">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.
11	Protection and switchgear <ul style="list-style-type: none">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.
12	Control Systems <ul style="list-style-type: none">Principles of feedback; transfer function; block diagrams; steady state errors; Routh and Niquist techniques; Bode plots; root loci; lag, lead and lead-leg compensation; state space model; state transition matrix, controllability and observability
13	Electrical and Electronic Measurements <ul style="list-style-type: none">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
14	Analog and Digital Electronics <ul style="list-style-type: none">Characteristics of diodes, BJT, FET; amplifiers biasing, equivalent circuit and frequency response; oscillators and feedback amplifiers; operational amplifiers characteristics and applications; 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 convertors; 8-bit microprocessor basics, architecture, programming and interfacing.
15	Power Electronics and Drives <ul style="list-style-type: none">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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16	Electronics and Control Systems <ul style="list-style-type: none">• Theoretical knowledge of capacitance, dielectric strength, semiconductor components, diodes, transistors amplifiers, SCR, UJT, rectifier circuits, thyristors and their functions and operations• Explain the basics of Control Systems. Explain the terms Open Loop, Closed Loop, Set Point, Deviation, Offset, Hunting, Negative Feedback. Applications. Different types of sensors and actuators.
17	ENGLISH <ul style="list-style-type: none">• Sentence Completion• Grammar• Vocabulary• Comprehension
18	APTITUDE <ul style="list-style-type: none">• Qualitative reasoning• Quantitative reasoning• Abstract reasoning• Spatial reasoning• Logical reasoning - ability to draw logical conclusions based on statements or arguments.