

Branch: Electrical Engg.

SYLLABUS FOR WRITTEN TEST (Objective Type)

1. Basic Electrical Engineering:	Concept of currents, voltage, resistance, power & energy, their units, Ohm's law, electrical symbols.
2. Circuit Laws:	Kirchhoff's law, Superposition, Thevenin, Norton, Star- delta network theorems with simple numerical.
3. Magnetic Circuit:	Concept of flux, EMF, inductance, different kind of magnetic materials, Electro-magnetic induction-Self & Mutual inductance.
4. A.C fundamentals:	Instantaneous, peak, RMS and average values of alternating waves, Representation of sinusoidal wave form, simple series and parallel AC Circuits consisting of RL and C, Resonance, Tank Circuit- Poly Phase system – star and delta connection, 3 phase power, DC and sinusoidal response of RL and R-C circuit Instantaneous, peak, R.M.S and average value of alternating wave, simple Series and Parallel A.C circuits consisting of Resistance, inductance & Capacitance, three-phase Star & Delta connection, Line voltage & phase voltage, current & power in a 3 ph ckt, with balanced and unbalanced load.
5. Electrical Machines:	Basic principles of AC & D.C. machines (Motors & Generators), construction, principles of operation, speed control & Starting, losses & efficiency of AC & D.C. Machines, equivalent circuit, voltage regulation. 3 point & 4 point starters. -Connection, starting, running, speed control of motors. Testing of D.C. motors. D.C. m/c Winding-- pole pitch, coil pitch, back pitch, front pitch , Lap & Wave winding , Progressive and retrogressive winding. Transformers: Working principle of Transformer, classification C.T., P.T. Instrument and Auto Transformer/Variac Construction, Single phase and Poly phase, O.C and SC tests, efficiency, Principle of operation, equivalent circuit, torque speed characteristics, starting and speed control of 3 phase induction motor, Generation of three phase EMF, 3-Phase induction motor, rotating magnetic field. Fractional KW motors, 1- Phase induction motor, Single phase induction motor, Working principle, different method of starting and running (capacitor start/capacitor run, shaded pole technique). FHP motors, DG Sets, operation. Synchronous machines: Generation of 3-phase emf armature reaction, voltage regulation, basic knowledge of AC alternators, synchronizing, control of active and reactive power Starting and applications of synchronous motors
6. Wiring, Estimation and costing:	Electric wirings, importance, I.E.E. rules. Types of wirings both domestic & industrial - Specifications for wiring – Grading of cables and current ratings. Principle of laying out in domestic wiring-testing by meggar-Estimation of lighting scheme (domestic as well as industrial wiring), electric installation of machines and relevant IE rules Earthing practices and IE Rules, load calculation. Estimation: Estimation of lighting scheme, electric installation of machine and relevant IE rules. Details of illumination system, details of load distribution, Design of electrical installation & its symbols (internal & external), Energy

	efficient equipment, energy audit, protection systems of Electrical circuit, Earthing Systems, Testing of Electrical Installations, types of cables –Overhead & underground.
7. Utilization of electrical energy	White light-illumination factors, intensity of light –importance of light, human eye factor units. Types illumination & lamps -Neon sign, LED Lamps, Mercury vapour, sodium vapour, Fluorescent tube CFL, Solar lamp applications, Concept of Energy - Characters watt ages, fixing places. Types of lighting. Decoration lighting Drum Switches, Direct & indirect lighting-efficiency in lumens per watt, colour available. Thumb rule calculations of lumens. Estimating placement of lights and fans and ratings- Electric heating, Electric welding, Electroplating, Electric drives and motors (three phase and single phase), Basic knowledge of lift and escalators.
8. Generation, Transmission and Distribution	Fuse / cut out / kit Kat – function, characteristics, and materials. H.R.C Fuses – application. Contactors – Miniature circuit breakers. Relays – Thermal, Electromagnetic, solid state relays, Control Relays and Protective Relays. Types of faults – symmetrical and unsymmetrical faults, short circuit current for symmetrical faults, Protection & Switchgear-rating of circuit breakers, principles of arc extinction by oil and air, H.R.C fuses, Protection earth leakage, Lightning Arrestors Different types of power stations, Load factor, diversity factor, demand factor, cost of generation, inter-connection of power stations Power factor improvement, various types of tariffs, types of faults, short circuit current for symmetrical faults Switchgears –Buchholtz relay, Merz-Price system of protection of generators & transformers, protection of feeders and bus bars Lightning arresters, various transmission and distribution system, comparison of conductor materials, efficiency of different system Cable – Different type of cables, cable rating and derating factor
9. Renewable Energy:	Solar Energy – Direct Uses, concept, working principle and application of solar thermal systems, Power Generation (On grid & Off Grid System) with simple numerical, Solar Photovoltaic System (SPV) Applications- Solar Lantern, Solar Home System, SPV Street Light, SPV Pumping systems-wind energy systems-mechanical timers
10. Battery	Battery- construction and operation, battery capacity & ratings. Battery tests Charging System- Applications
11. Electrical measuring Instruments	Deflecting torque, Controlling torque & Damping torque , - Moving coil permanent magnet -Moving iron -Range extension, Multimeter -Wattmeter - P.F. meter -Intergrading type, Digital Energy meter – megger. -Energy meter -Frequency meter - Tri vector meter -Max Demand meter -Phase Sequence indicator - Multimeter –Analog and Digital - C.R.O, classification of instruments Static terms and characteristics: Range and Span, Accuracy and Precision, Reliability, Calibration, Hysteresis and Dead zone, Drift, Sensitivity, Threshold and Resolution, Repeatability and Reproducibility, Linearity.
12. Basic Electronics	Electronics- Atomic structure of elements. The electron Energy of an electron valence electrons , Free electrons,-Semi-Conductor Physics, Semi-conductor Bonds in semiconductor-

	<p>commonly use semiconductors, energy band description of semiconductors-intrinsic semiconductor-extrinsic semiconductor-properties of p-n junction, Semi-conductor diode, logic gates, half wave rectifier-full wave rectifier, 4ener diode, special diodes, LEDs, optical diodes. Transistors: Field effect transistors, Uni-junction Transistor (UJT): Construction, working principle, advantage & application Rectifiers: Silicon Controlled Rectifier (SCR), Triac: Construction, working principle, advantage & application.</p>
<p>13. Regulated D.C. Power Supply:</p>	<p>Ordinary D.C. Power supply, Regulated power supply. Types of voltage regulators - Zenor diode voltage regulator.</p>