

Syllabus for the post of Assistant Professor- Electrical, Government Engineering College, Maharashtra Engineering College Teachers Service, Group - A

Steps of Exam: Written Exam - 200 Marks	Interview - 50 Marks
Level: - Degree	No. of Questions: - 100
Medium: English	No. of Marks: - 200
Nature of Paper - Objective Type	Duration: - 1 hour
Final merit list will be prepared by considering the marks obtained in Written test & Interview.	

SYLLABUS

Energy Scenario: Commercial and Non – commercial energy, primary energy resources, commercial energy production, energy consumption, Indian and Maharashtra energy scenario, Energy conservation Act 2001 and its features, Electricity Act 2003, Safety regulation 2010.

Electric Circuits: Network graph, KCL, KVL, node and mesh analysis, sinusoidal steady-state analysis, basic filter concepts; ideal current and voltage sources, Thevenin's, Norton's and Superposition and Maximum Power Transfer theorems.

Electrical 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 multimeters; phase, time and frequency measurement; Q-meters; oscilloscopes; potentiometric recorders; error analysis. Megger, earth tester and low and high resistance meters and their specifications.

Electronics: Diodes, BJT, FET and their characteristics; amplifiers – biasing, equivalent circuit, 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 converters; 8-bit microprocessor basics, Power diodes, transistors, thyristors, triacs, GTOs, MOSFETs and IGBTs – static characteristics and principles of operation; triggering circuits; phase control rectifiers;

Digital Electronics: Number systems, binary codes, logic gates, Boolean algebra, laws & theorems, implementation of Boolean expressions using logic gates, standard forms of Boolean expression.

Communication Systems : Block diagram of a basic communication system, frequency spectrum, need for modulation, methods of modulation, principles of AM, FM, pulse analog and pulse digital modulation, AM / FM transmitters & receivers

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.

Electric Field: 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.

Electrical Machines: Single phase transformer – equivalent circuit, phasor diagram, tests, regulation and efficiency; three phase transformers – connections, parallel operation; auto-transformer;

DC machines – types, windings, generator characteristics, armature reaction and commutation, three phase induction motors – principles, types, performance characteristics,

Single phase induction motors- principle and types; synchronous machines – principle, regulation and parallel operation of generators, motor starting, applications; servo and stepper motors. Energy efficient motors.

Electrical drives: DC and AC drives, basic Parts, duty cycle, steady state stability, starting methods, braking methods and speed control method; fully controlled and half controlled bridge converters; choppers and inverters.

Power system: Different Power plants- power generation concepts; conventional and non-conventional, transmission line models and performance; corona effect; per-unit system; Zbus and Ybus matrices; load flow; voltage control; power factor correction; economic operation; symmetrical components; fault analysis of symmetrical and unsymmetrical systems;

Power system Protection :principles of over-current, differential and distance protection; solid state relays and digital protection; circuit breakers; ratings and capacity

HVDC transmission and FACTs Technology: Problems of AC transmission system, evolution of FACTs technology, principle of operation.

Reactive Power management: Necessity of reactive power control. Power quality issues: Sources of harmonics and its mitigation, sag, swell, voltage flicker, unbalance and their mitigation.

Substation layout- types, earthing types and design, Causes of overvoltages- Lightning arrester-types, selection, Cable fault locaters and cable jointing.
