



অসম লোকসেৱা আয়োগ

ASSAM PUBLIC SERVICE COMMISSION

Jawaharnagar, Khanapara, Guwahati-781022.

S Y L L A B U S

**Assistant Manager (Electrical) in Assam Power Distribution Company Limited (APDCL)
(ADVT. NO 06/2023 dated 28th March, 2023)**

PAPER-I

Electrical Engineering

(Multiple Choice Question Type)

(Bachelor's Degree Standard)

Full Marks: 150 Marks

Time: 2-00 hours

Section 1: Engineering Mathematics

Linear Algebra: Matrix algebra, Systems of linear equations, Eigen values and Eigen vectors.

Calculus: Mean value theorems, Theorems of integral calculus, Evaluation of definite and improper integrals, Partial Derivatives, Maxima and minima, multiple integrals, Fourier series, Vector identities, Directional derivatives, Line integral, Surface integral, Volume integral, Stokes's theorem, Gauss's theorem, Divergence theorem, Green's theorem.

Differential Equations: First order equations (Linear and non-linear), higher order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy's equation, Euler's equation, initial and boundary value problems. Partial Differential Equations, Method of separation of variables.

Complex Variables: Analytic functions, Cauchy's integral theorem, Cauchy's integral formula, Taylor series, Laurent series, Residue theorem, Solution integrals.

Probability and Statistics: Sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random Variables, Discrete and Continuous distributions, Poisson and Normal Distribution, Binomial distribution, Correlation analysis, Regression analysis.

Section 2: Electric circuits

Network Elements: ideal voltage and current sources, dependent sources, R, L, C, M elements, Network solution methods: KCL, KVL, Node and Mesh analysis, Network Theorems: Thevenin's, Norton's Superposition and Maximum Power Transfer theorem, Transient response of dc and ac networks, sinusoidal steady-state analysis, resonance, two port networks, balanced three phase circuits, star-delta transformation, complex power and power factor in ac circuits.

Section 3: Electromagnetic Fields

Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss's Law, Divergence, Electric field and potential due to point, line, plane and spherical charge distributions, Effect of dielectric medium, Capacitance of simple configurations, Biot-Savart's law, Ampere's law, Curl,

Faraday's law, Lorentz force, Inductance, Magnetomotive force, Reluctance, Magnetic circuits, Self and Mutual inductance of simple configurations.

Section 4: Signals and Systems

Representation of continuous and discrete time signals, shifting and scaling properties, linear time invariant and causal systems, Fourier series representation of continuous and discrete time periodic signals, sampling theorem, Applications of Fourier Transform for continuous and discrete time signals, Laplace Transform and Z transform. R.M.S. value, average value calculation for any general periodic waveform.

Section 5: Electrical Machines

Single phase transformer: equivalent circuit, phasor diagram, open circuit and short circuit tests, regulation and efficiency, Three-phase transformers, connections, vector groups, parallel operation, Auto-transformer, Electromechanical energy conversion principles, DC machines, separately excited, series and shunt, motoring and generating mode of operation and their characteristics, speed control of dc motors, Three-phase induction machines, Principle of operation, types, performance, torque-speed characteristics, no-load and blocked-rotor tests, equivalent circuit, starting and speed control, Operating principle of single-phase induction motors, Synchronous machines, cylindrical and salient pole machines, performance and characteristics, regulation and parallel operation of generators, starting of synchronous motors, Types of losses and efficiency calculations of electric machines..

Section 6: Power Systems

Basic concepts of electrical power generation, ac and dc transmission concepts, Models and performance of transmission lines and cables, Economic Load Dispatch (with and without considering transmission losses), Series and shunt compensation, Electric field distribution and insulators, Distribution systems, Per-unit quantities, Bus admittance matrix, Gauss-Seidel and Newton-Raphson load flow methods, Voltage and Frequency control, Power factor correction, Symmetrical components, Symmetrical and unsymmetrical fault analysis, Principles of over-current, differential, directional and distance protection, Circuit breakers, System stability concepts, Equal area criterion.

Section 7: Control Systems

Mathematical modelling and representation of systems, Feedback principle, transfer function, Block diagrams and Signal flow graphs, Transient and Steady-state analysis of linear time invariant systems, Stability analysis using Routh-Hurwitz and Nyquist criteria, Bode plots, Root loci, Lag, Lead and Lead-Lag compensators, P, PI and PID controllers, State space model, Solution of state equations of LTI systems.

Section 8: Electrical and Electronic Measurements

Bridges and Potentiometers, Measurement of voltage, current, power, energy and power factor, Instrument transformers, Digital voltmeters and multi-meters, Phase, Time and Frequency measurement, Oscilloscopes, Error analysis.

Section 9: Analog and Digital Electronics



Simple diode circuits: clipping, clamping, rectifiers, Amplifiers: biasing, equivalent circuit and frequency response, oscillators and feedback amplifiers, operational amplifiers, characteristics and applications, single stage active filters, Active Filters, Sallen Key, Butterworth, VCOs and timers, combinatorial and sequential logic circuits, multiplexers, demultiplexers, Schmitt triggers, sample and hold circuits, A/D and D/A converters.

Section 10: Power Electronics

Static V-I characteristics and firing/gating circuits for Thyristor, MOSFET, IGBT, DC to DC conversion, Buck, Boost and Buck-Boost Converters, Single and three-phase configuration of uncontrolled rectifiers, Voltage and Current commutated Thyristor based converters, Bidirectional ac to dc voltage source converters, Magnitude and Phase of line current harmonics for uncontrolled and thyristor based converters, Power factor and Distortion Factor of ac to dc converters, Single-phase and three-phase voltage and current source inverters, sinusoidal pulse width modulation.



Controller of Examinations,
Assam Public Service Commission,
Jawaharnagar, Khanapara, Guwahati-22

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PAPER-II

GENERAL STUDIES

(Multiple Choice Question Type)

Full Marks: 100 Marks

Time: 2-00 hours

Subject	Item / Topic	Marks
General English	1. Synonyms, Antonyms 2. Prepositions 3. Sentence Completion 4. Active and Passive Voice 5. Spelling Test 6. Spotting Errors 7. Passage Completion 8. Substitution 9. Sentence Arrangement 10. Transformation 11. Idioms and Phrases 12. Sentence Improvement 13. Joining Sentences 14. Error Correction (Underlined Part) 15. Error Correction (Phrase in Bold) 16. Fill in the blanks	75
General Knowledge	1. Current Affairs 2. General Science 3. Basic Computer 4. General issues on Environment- ecology, Bio-Diversity and Climate Change- that do not require subject specialization.	25

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