AP PGECET 2025 Electrical Engineering Syllabus

Engineering Mathematics Syllabus

Linear Algebra	- Matrix algebra - Systems of linear equations - Eigenvalues and eigenvectors
Calculus	- Mean value theorems - Evaluation of definite and improper integrals - Theorems of integral calculus
Differential Equations	- First-order equations (linear and non-linear) - Higher-order linear differential equations with constant coefficients - Methods of variations parameters - Cauchy's & Euler's equations - Initial and boundary value problems - Partial differential equations and variable separable method
Complex Variables	- Analytic functions - Cauchy's integral theorem and integral formula - Taylor & Laurent series - Residue theorem - Solution integrals
Probability & Statistics	- Probability and sampling theorems - Conditional probability - Probability of the density function - Mean/median/mode/standard deviation - Random variables - Discrete and continuous distributions - Exponential/ poisson/ normal/ binomial distributions - Correlation and regression analysis

Numerical Methods	● Solutions of non-linear algebraic equations ● Single & multi-step methods for differential equations

Electrical Engineering Syllabus

Electric Circuits & 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 Bio-Savart's law ● Inductance ● Dielectrics ● Capacitance
Signals & Systems	● Representation of continuous and discrete time signals ● Shifting and scaling operations ● Linear, time-invariant, casual systems ● Fourier series representation of continuous periodic signals ● Sampling theorem ● Fourier/ laplace/ z transforms
Electrical Machines	● Single phase transformer - equivalent circuit ● Phasor diagram/ test/ regulation/ efficiency

	- Three-phase transformers - connections/ parallel operation - Autotransformer - Energy conversion principles - DC Machines - Types/ windings/ general 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
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/ lead-lag compensation - State space model - State transition matrix - Controllability & observability
Electrical and Electronic Measurement	- Bridges and potentiometers - PMMC/ moving iron/ dynamometer/induction-type instruments - Measurement of voltage/ current/ power/ energy/ and power factor - Instrument transformers - Digital voltmeters and multimeters - Phase/ time/ frequency measurements - Q-meters - Oscilloscopes - Potentiometric recorders - Error of analysis
Analog and Digital Electronics	- Characteristic of diodes - BJT/FET/ amplifiers - biasing/ equivalent circuit/ 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 converters 8-bit microprocessors basics - Architecture, programming, and interfacing

Power Electronics and Drives	- Semiconductor power diodes - Transistors - Thyristors - Triacs - GTO's - MOSFETs and IBGTs - static characteristics and principles of operations - Triggering circuits - Phase control rectifiers - Bridge converters - fully controlled and half controlled - Principles of choppers and inverters - Basic concepts of adjustable speed DC and AC drives
Electric Traction Systems	- Speed time curves - Specific energy consumption - Mechanism of train movement