



YOUR CAREER QUEST ENDS HERE

GATE
ELECTRICAL
ENGINEERING
SYLLABUS

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“All the best for a bright future!

May there be success at every turn of life and all your dreams come true.”

Section 1: Engineering Mathematics

Linear Algebra:

- Matrix Algebra
- Systems of linear equations
- Eigenvalues
- Eigenvectors

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
- Green's theorem

Differential equations:

- First order equations (linear and nonlinear)
- 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
- Standard Deviation
- Random variables
- Discrete and Continuous distributions,
- Poisson distribution
- Normal distribution
- Binomial distribution
- Correlation analysis
- Regression analysis

Numerical Methods:

- Solutions of nonlinear algebraic equations
- Single and Multi-step methods for differential equations

Transform Theory:

- Fourier Transform
- Laplace Transform
- z_Transform.

Electrical Engineering

Section 2: Electric Circuits

- Network graph,
- KCL, KVL, Node and Mesh analysis,
- Transient response of dc and ac networks,
- Sinusoidal steady_state analysis,
- Resonance, Passive filters,
- Ideal current and voltage sources,
- Thevenin's theorem,
- Norton's theorem,
- Superposition theorem,
- Maximum power transfer theorem,
- Two_port networks,
- Three phase circuits,
- 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 operations
- Linear Time Invariant and Causal systems
- Fourier series representation of continuous periodic signals
- Sampling theorem, Applications of Fourier Transform
- Laplace Transform and z-Transform

Section 5: Electrical Machines

- Single phase transformer:
 - equivalent circuit, phasor diagram
 - open circuit and short circuit tests
 - regulation and efficiency
- Three phase transformers:
 - connections
 - parallel operation
 - Auto_transformer
 - Electromechanical energy conversion principles
- DC machines:
 - separately excited
 - series and shunt
 - motoring and generating mode of operation and their characteristics, starting and speed control of dc motors
- Three phase induction motors:

- 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, regulation and parallel operation of generators
 - starting of synchronous motor, characteristics
 - Types of losses and efficiency calculations of electric machines

Section 6: Power Systems

- Power generation concepts
- ac and dc transmission concepts
- Models and performance of transmission lines and cables
- 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 and distance protection
- Circuit breakers
- System stability concepts
- Equal area criterion

Section 7: Control Systems

- Mathematical modeling and representation of systems
- Feedback principle
- Transfer function, Block diagrams and Signal flow graphs
- Transient and Steady state analysis of linear time invariant systems
- Routh-Hurwitz and Nyquist criteria
- Bode plots, Root loci, Stability analysis
- Lag, Lead and Lead_Lag compensators
- P, PI and PID controllers
- State space model, State transition matrix

Section 8: Electrical and Electronic Measurements

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

Section 9: Analog and Digital Electronics

- Characteristics of diodes, BJT, MOSFET
- Simple diode circuits:
 - clipping, clamping, rectifiers
- 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, Demultiplexer
 - Schmitt trigger
 - Sample and hold circuits
 - A/D and D/A converters
- 8085 Microprocessor:
 - Architecture, Programming and Interfacing

Section 10: Power Electronics

- Characteristics of semiconductor power devices:
 - Diode, Thyristor, Triac, GTO, MOSFET, IGBT
- DC to DC conversion:
 - Buck, Boost and Buck-Boost converters
- Single and three phase configuration of uncontrolled rectifiers
- Line commutated thyristor based converters
- Bidirectional ac to dc voltage source converters
- Issues of line current harmonics
- Power factor, Distortion factor of ac to dc converters
- Single phase and three phase inverters
- Sinusoidal pulse width modulation

“Best of Luck”