

Introductory Course on Fundamentals of Engineering Examination (FEE) in Electrical Engineering – What You’ll Learn

EE101 Principles of Power Engineering

- Three-phase Circuits and Systems - Review of single-phase circuits. Three-phase voltage generation. Phasor diagrams. Wye and delta connections. Balanced three-phase loads. Active, reactive and apparent power. Power measurements. Power factor correction.
- Magnetism and Magnetic Circuits – Magnetic fields. Magnetic materials and magnetization curves. Magnetic equivalent circuits. Electromagnetic induction. Sinusoidal excitation. Magnetic losses.
- Transformers – Ideal transformer. Equivalent circuits. Phasor diagrams. Determination of parameters. Performance evaluation. Autotransformers. Three-phase transformers.
- AC and DC Machines – DC Machines: operating principle, voltage and torque equations, classification, torque-speed characteristics, losses and efficiency. Three-phase induction motors: operating principle, equivalent circuit, torque-speed characteristics, losses and efficiency.
- Power Electronics and Drives – Introduction to power conversion. Harmonics. AC to DC conversion. DC to DC conversion. DC to AC conversion. DC servo motor drive systems. AC variable-speed induction motor drive systems. Permanent magnet and stepping motor drive systems.
- Fundamental of Power Systems – Energy sources. Per unit system. Power system components and representation: synchronous generators, transmission lines and cables. Load representations. Power transfer.
- Power Flow Modelling – System components modelling. Formulation of power flow equations. Methods of power flow solution. Case studies.

EE201 Power System Analysis and Utilizations

- Active Power and Frequency Control – Governor control systems. Area control errors and load frequency control. Energy offers. Transmission losses, penalty factors and loss coefficients. Economic dispatch. Automatic generation control. Electricity market environment. Active power control devices.
- Reactive Power and Voltage Control – Production and absorption of reactive power. Methods of voltage control. Reactive power and voltage control devices. Application to transmission and distribution systems.
- Analysis of Unsymmetrical Faults – Three-phase faults and fault level calculations. Symmetrical components. Sequence impedances and sequence networks. Unsymmetrical faults.
- Electric Power Distribution Systems – Distribution system configurations. Primary and secondary distribution. Ring, radial and inter-connected systems. Distribution substation layout. Planning criteria and network design. Fault diagnosis and restoration of supply. Expert system applications.
- Building Services Engineering – Estimation of power demand. LV cables and busway systems. Conductor sizing factors. Circuit protective conductor. Earth leakage and touch voltage. Inspection and testing. Lightning protection.
- General Protection Principles – Basic protection principles Instrument transformers. Coordination of overcurrent and earth protection for distribution systems. Pilot-wire differential protection of feeders.
- Applications of High-voltage Engineering – Acceptance and routine tests on apparatus. Fault locating methods. Condition monitoring and aging assessment. Case studies.