

ELECTRICAL & ELECTRONICS ENGINEERING

COURSE CODE	15EE32 ELECTRIC CIRCUIT ANALYSIS
C01	Apply knowledge of mathematics, science, and engineering to the analysis and design of electrical circuits.
C02	Identify, formulate, and solve engineering problems in the area circuits and systems.
C03	Analyze the solution and infer the authenticity of it.
COURSE CODE	15EE33 TRANSFORMERS AND GENERATORS
C01	Explain the construction and operation and performance of transformers.
C02	Explain different connections for the three phase operations, their advantages and applications.
C03	Explain the construction and operation of Synchronous machines and evaluate the regulation of synchronous machines by different methods.
C04	Analyze the operation of the synchronous machine connected to infinite machine.
COURSE CODE	15EE34 ANALOG ELECTRONIC CIRCUITS
C01	Utilize the characteristics of transistor for different applications.
C02	Design and analyze biasing circuits for transistor.
C03	Design, analyze and test transistor circuitry as amplifiers and oscillators.
COURSE CODE	15EE35 DIGITAL SYSTEM DESIGN
C01	Design and analyze combinational & sequential circuits
C02	Design circuits like adder, sub tractor, code converter etc.
C03	Understand counters and sequence generators.
COURSE CODE	15EE36 ELECTRICAL AND ELECTRONIC MEASUREMENTS
C01	Explain the importance of units and dimensions.
C02	Measure resistance, inductance and capacitance by different methods.
C03	Explain the working of various meters used for measurement of power and energy.
C04	Explain the working of different electronic instruments and display devices.
COURSE CODE	15EEL37 ELECTRICAL MACHINES LABORATORY - 1
C01	Conduct different tests on transformers and synchronous generators and evaluate their performance.
C02	Connect and operate two single phase transformers of different KVA rating in parallel.
C03	Connect single phase transformers for three phase operation and phase conversion.
C04	Assess the performance of synchronous generator connected to infinite bus.
COURSE CODE	15EEL38 ELECTRONICS LABORATORY
C01	Design and test different diode circuits.
C02	Design and test amplifier and oscillator circuits and analyse their performance.
C03	Use universal gates and ICs for code conversion and arithmetic operations.
C04	Design and verify on of different counters.
COURSE CODE	15EE42 POWER GENERATION AND ECONOMICS
C01	Describe the working of hydroelectric, steam, nuclear power plants and state functions of

	major equipment of the power plants.
C02	Classify various substations and explain the importance of grounding.
C03	Understand the economic aspects of power system operation and its effects.
C04	Explain the importance of power factor improvement.
COURSE CODE	15EE43 TRANSMISSION AND DISTRIBUTION
C01	Explain the concepts of various methods of generation of power.
C02	Explain the importance of HVAC, EHVAC, UHVAC and HVDC transmission.
C03	Design and analyze overhead transmission system for a given voltage level.
C04	Calculate the parameters of the transmission line for different configurations and assess the performance of line.
C05	Explain the use of underground cables and evaluate different types of distribution systems.
COURSE CODE	15EE44 ELECTRIC MOTORS
C01	Explain the constructional features of Motors and select a suitable drive for specific application.
C02	Analyze and assess the performance characteristics of DC motors by conducting suitable tests and control the speed by suitable method.
C03	Explain the constructional features of Three Phase and Single phase induction Motors and assess their performance.
C04	Control the speed of induction motor by a suitable method.
C05	Explain the operation of Synchronous motor and special motors.
COURSE CODE	15EE45 ELECTROMAGNETIC FIELD THEORY
C01	Use different coordinate systems to explain the concept of gradient, divergence and curl of a vector.
C02	Use Coulomb's Law and Gauss Law for the evaluation of electric fields produced by different charge configurations.
C03	Calculate the energy and potential due to a system of charges.
C04	Explain the behaviour of electric field across a boundary between a conductor and dielectric and between two different dielectrics.
C05	Explain the behaviour of magnetic fields and magnetic materials.
C06	Assess time varying fields and propagation of waves in different media.
COURSE CODE	15EE46 OPERATIONAL AMPLIFIERS AND LINEAR ICs
C01	At the end of the course the student will be able to:
C02	Explain the basics of linear ICs.
C03	Design circuits using linear ICs.
C04	Demonstrate the application of Linear ICs.
C05	Use ICs in the electronic projects.
COURSE CODE	15EEL47 ELECTRICAL MACHINES LABORATORY -2
C01	To perform tests on dc machines to determine their characteristics.
C02	To control the speed of dc motor.
C03	To conduct test for pre-determination of the performance characteristics of dc machines
C04	To conduct load test on single phase and three phase induction motor.
C05	To conduct test on induction motor to determine the performance characteristics.

C06	To conduct test on synchronous motor to draw the performance curves.
COURSE CODE	15EEL48 OP- AMP AND LINEAR ICS LABORATORY
C01	To conduct experiment to determine the characteristic parameters of OP-Amp
C02	To design test the OP-Amp as Amplifier, adder, subtractor, differentiator and integrator
C03	To design test the OP-Amp as oscillators and filters
C04	Design and study of Linear IC's as multi vibrator power supplies.
COURSE CODE	15EE51 MANAGEMENT AND ENTREPRENEURSHIP
C01	Explain the field of management, task of the manager, planning and the need of proper staff, recruitment and selection process.
C02	Discuss work allocation, the structure of organization, the modes of communication and importance of managerial control in business.
C03	To explain need of coordination between the manager and staff in exercising the authority and delegating duties.
C04	To explain the social responsibility of business and leadership
C05	Explain the concepts of entrepreneurship and the role and importance of the entrepreneur in economic development.
C06	Show an understanding of the role and importance of Small Scale Industries, business plan and its presentation.
C07	Discuss the concepts of project management, capitol building process, project feasibility study, project appraisal and project financing.
C08	Discuss the state /central level institutions / agencies supporting business enterprises.
COURSE CODE	15EE52 MICROCONTROLLER
C01	Discuss the history of the 8051 and features of other 8051 family members and the internal architecture of the 8051.
C02	Explains the use of an 8051 assembler, the stack and the flag register, loop, jump, and call instructions.
C03	Discuss 8051 addressing modes, accessing data and I/O port programming, arithmetic, logic instructions, and programs.
C04	Develop 8051C programs for time delay, I/O operations, I/O bit manipulation, logic and arithmetic operations, data conversion and data serialization
C05	Discuss the hardware connection of the 8051 chip, its timers, serial data communication and its interfacing of 8051to the RS232.
C06	Discuss in detail 8051 interrupts and writing interrupt handler programs.
C07	Interface 8051 with real-world devices such as LCDs and keyboards, ADC, DAC chips and sensors.
C08	Interface 8031/51 with external memories, 8255 chip to add ports and relays, opt isolators and motors
COURSE CODE	15EE53 POWER ELECTRONICS
C01	Explain application area of power electronics, types of power electronic circuits and switches their characteristics and specifications.
C02	Explain types of power diodes, their characteristics, and the effects of power diodes on RL circuits.
C03	Explain the techniques for design, operation and analysis of single phase diode rectifier circuits.
C04	Explain steady state, switching characteristics and gate control requirements of different

	power transistors and their limitations.
C05	Discuss different types of Thyristors, their operation, gate characteristics and gate control requirements.
C06	Explain designing, analysis techniques and characteristics of thyristor controlled rectifiers.
C07	Discuss the principle of operation of single phase and three phase DC - DC, DC –AC converters and AC voltage controllers.
COURSE CODE	15EE54 SIGNALS AND SYSTEMS
C01	Classify the signals and systems.
C02	Explain basic operations on signals and properties of systems.
C03	Use convolution in both continuous and discrete domain for the analysis of systems given the impulse response of a system.
C04	Evaluate response of a given linear time invariant system.
C05	Provide block diagram representation of a linear time invariant system.
C06	Apply continuous time Fourier transform representation to study signals and linear time invariant systems.
C07	Apply discrete time Fourier transform representation to study signals and linear time invariant systems.
C08	Use Z-transform and properties of Z transform for the analysis of discrete time systems.
COURSE CODE	15EE553 ELECTRICAL ESTIMATION AND COSTING
C01	Explain the purpose of estimation and costing.
C02	Discuss market survey, estimates, purchase enquiries, preparation of tenders, comparative statements and payment of bills.
C03	Discuss Indian Electricity act and Indian Electricity rules.
C04	Discuss distribution of energy in a building, wiring and methods of wiring, cables used in internal wiring, wiring accessories and fittings, fuses and types of fuses.
C05	Discuss design of lighting points and its number, total load, sub-circuits, size of conductor.
C06	Discuss types of service mains and estimation of service mains and power circuits.
C07	Discuss estimation of overhead transmission and distribution system and its components.
C08	Discuss main components of a substation, preparation of single line diagram of a substation and earthing of a substation.
COURSE CODE	15EE563 RENEWABLE ENERGY RESOURCES
C01	Discuss causes of energy scarcity and its solution, energy resources and availability of renewable energy.
C02	Discuss energy from sun, energy reaching the Earth's surface and solar thermal energy applications.
C03	Discuss types of solar collectors, their configurations, solar cell system, its characteristics and their applications.
C04	Discuss generation of energy from hydrogen, wind, geothermal system, solid waste and agriculture refuse.
C05	Discuss production of energy from biomass, biogas.
C06	Discuss tidal energy resources, energy availability and power generation.
C07	Discuss power generation sea wave energy and ocean thermal energy.

COURSE CODE	15EEL57 MICROCONTROLLER LABORATORY - 1
C01	Write assembly language programs for data transfer, arithmetic, Boolean and logical instructions.
C02	Write ALP for code conversions.
C03	Write ALP using subroutines for generation of delays, counters, configuration of SFRs for serial communication and timers.
C04	Perform interfacing of stepper motor and dc motor for controlling the speed.
C05	Generate different waveforms using DAC interface.
C06	Work with a small team to carryout experiments using microcontroller concepts and prepare reports that present lab work.
COURSE CODE	15EEL58 POWER ELECTRONICS LABORATORY
C01	Obtain static characteristics of semiconductor devices to discuss their performance.
C02	Trigger the SCR by different methods
C03	Verify the performance of single phase controlled full wave rectifier and AC voltage controller with R and RL loads.
C04	Control the speed of a dc motor, universal motor and stepper motors.
C05	Verify the performance of single phase full bridge inverter connected to resistive load.
C06	Perform commutation of SCR by different methods.
COURSE CODE	15EE61 CONTROL SYSTEMS
C01	Discuss the effects of feedback and types of feedback control systems.
C02	Evaluate the transfer function of a linear time invariant system.
C03	Evaluate the stability of linear time invariant systems.
C04	Apply block diagram manipulation and signal flow graph methods to obtain transfer function of systems.
C05	Demonstrate the knowledge of mathematical modeling of control systems and components
C06	Determine transient and steady state time response of a simple control system.
C07	Investigate the performance of a given system in time and frequency domains.
C08	Discuss stability analysis using Root locus, Bode plots and Nyquist plots.
C09	Determine the controller or compensator configuration and parameter values relative to how it is connected to the controlled process given the design specifications.
COURSE CODE	15EE62 POWER SYSTEM ANALYSIS – 1
C01	Show understanding of per unit system, its advantages and computation.
C02	Show the concept of one line diagram and its implementation in problems
C03	Perform short circuit analysis on a synchronous machine and simple power system to select a circuit breaker for the system.
C04	Evaluate symmetrical components of voltages and currents in un-balanced three phase circuits.
C05	Explain the concept of sequence impedance and sequence networks of power system components and power system.
C06	Analyze three phase synchronous machine and simple power systems for different unsymmetrical faults using symmetrical components.
C07	Discuss the dynamics of synchronous machine, stability and types of stability.

C08	Discuss equal area criterion for the evaluation of stability of a simple system under different fault conditions.
COURSE CODE	15EE63 DIGITAL SIGNAL PROCESSING
C01	Compute the DFT of various signals using its properties and linear filtering of two sequences.
C02	Apply fast and efficient algorithms for computing DFT and inverse DFT of a given sequence
C03	Design infinite impulse response Butterworth digital filters using impulse invariant / bilinear transformation technique.
C04	Design infinite impulse response Chebyshev digital filters using impulse invariant or bilinear transformation technique.
C05	Realize a digital IIR filter by direct, cascade, parallel and ladder methods of realization.
C06	Discuss different window functions and frequency sampling method used for design of FIR filters.
C07	Design FIR filters by use of window function or by frequency sampling method.
C08	Realize a digital FIR filter by direct, cascade, and linear phase form.
COURSE CODE	15EE64 ELECTRICAL MACHINE DESIGN
C01	Discuss design factors, limitations, modern trends in design, manufacturing of electrical machines and properties of materials used in the electrical machines.
C02	Derive the output equations of transformer, DC machines and AC machines.
C03	Discuss selection of specific loadings and magnetic circuits of different electrical machines
C04	Design the field windings of DC machine and Synchronous machine.
C05	Design stator and rotor circuits of a DC and AC machines.
C06	Estimate the number of cooling tubes, no load current and leakage reactance of core type transformer.
C07	Discuss short circuit ratio and its effects on performance of synchronous machines.
C08	Design salient pole and non-salient pole alternators for given specifications.
COURSE CODE	15EE653 ENERGY AUDIT AND DEMAND SIDE MANAGEMENT
C01	Understand the need of energy audit and energy audit methodology.
C02	Explain audit parameters and working principles of measuring instruments used to measure the parameters.
C03	Conduct energy audit of boilers, furnaces, power plant, steam distribution system and compressed air systems.
C04	Conduct energy audit HVAC systems, motors, pumps, blowers and cooling towers.
C05	Explain load management techniques, effects of harmonics, electricity tariff, improvement of power factor and losses in transmission.
C06	Conduct energy audit of lighting systems and buildings.
C07	Show an understanding of demand side management and energy conservation.
COURSE CODE	15EE662 SENSORS AND TRANSDUCERS

C01	Discuss need of transducers, their classification, advantages and disadvantages.
C02	Show an understanding of working of various transducers and sensors.
C03	Discuss recent trends in sensor technology and their selection.
C04	Discuss basics of signal conditioning and signal conditioning equipment.
C05	Discuss configuration of Data Acquisition System and data conversion.
C06	Show knowledge of data transmission and telemetry.
C07	Explain measurement of non-electrical quantities -temperature, flow, speed, force, torque, power and viscosity.
COURSE CODE	15EEL67 CONTROL SYSTEM LABORATORY
C01	Use software package or discrete components in assessing the time and frequency domain responses of a
C02	given second order system.
C03	Design and analyze Lead, Lag and Lag – Lead compensators for given specifications.
C04	Determine the performance characteristics of ac and dc servomotors and synchro-transmitter receiver pair used in control systems .
C05	Simulate the DC position and feedback control system to study the effect of P, PI, PD and PID controller and Lead compensator on the step response of the system.
C06	Write a script files to plot root locus, Bode plot, Nyquist plots to study the stability of the system using a software package.
C07	Work with a small team to carryout experiments and prepare reports that present lab work.
COURSE CODE	15EEL68 DIGITAL SIGNAL PROCESSING LABORATORY
C01	Give physical interpretation of sampling theorem in time and frequency domains.
C02	Evaluate the impulse response of a system.
C03	Perform convolution of given sequences to evaluate the response of a system.
C04	Compute DFT and IDFT of a given sequence using the basic definition and/or fast methods.
C05	Provide a solution for a given difference equation.
C06	Design and implement IIR and FIR filters
C07	Conduct experiments using software and prepare reports that present lab work
COURSE CODE	15EE71 POWER SYSTEM ANALYSIS – 2
C01	Formulate network matrices and models for solving load flow problems.
C02	Perform steady state power flow analysis of power systems using numerical iterative techniques.
C03	Suggest a method to control voltage profile.
C04	Show knowledge of optimal operation of generators on a bus bar, optimal unit commitment,
C05	Discuss optimal scheduling for hydro-thermal system, power system security and reliability.
C06	Analyze short circuit faults in power system networks using bus impedance matrix.
C07	Perform numerical solution of swing equation for multi-machine stability ■
COURSE CODE	15EE72 POWER SYSTEM PROTECTION
C01	Discuss performance of protective relays, components of protection scheme and relay terminology over current protection.

C02	Explain the working of distance relays and the effects of arc resistance, power swings, line length and source impedance on performance of distance relays.
C03	Discuss pilot protection; wire pilot relaying and carrier pilot relaying.
C04	Discuss construction, operating principles and performance of differential relays for differential protection.
C05	Discuss protection of generators, motors, Transformer and Bus Zone Protection.
C06	Explain the principle of circuit interruption in different types of circuit breakers.
C07	Describe the construction and operating principle of different types of fuses and to give the definitions of different terminologies related to a fuse.
C08	Discuss protection against Over voltages and Gas Insulated Substation (GIS).
COURSE CODE	15EE73 HIGH VOLTAGE ENGINEERING
C01	Explain conduction and breakdown phenomenon in gases, liquid dielectrics.
C02	Explain breakdown phenomenon in solid dielectrics.
C03	Explain generation of high voltages and currents
C04	Discuss measurement techniques for high voltages and currents.
C05	Discuss overvoltage phenomenon and insulation coordination in electric power systems.
C06	Discuss non-destructive testing of materials and electric apparatus and high-voltage testing of electric apparatus
COURSE CODE	15EE742 UTILIZATION OF ELECTRICAL POWER
C01	Discuss electric heating, air-conditioning and electric welding.
C02	Explain laws of electrolysis, extraction and refining of metals and electro deposition.
C03	Explain the terminology of illumination, laws of illumination, construction and working of electric lamps.
C04	Design interior and exterior lighting systems- illumination levels for factory lighting- flood lighting-street lighting.
C05	Discuss systems of electric traction, speed time curves and mechanics of train movement.
C06	Explain the motors used for electric traction and their control.
C07	Discuss braking of electric motors, traction systems and power supply and other traction systems.
C08	Explain the working of electric and hybrid electric vehicles.
COURSE CODE	15EE752 TESTING AND COMMISSIONING OF POWER SYSTEM APPARATUS
C01	Describe the process to plan, control and implement commissioning of electrical equipment's.
C02	Differentiate the performance specifications of transformer and induction motor.
C03	Demonstrate the routine tests for synchronous machine, induction motor, transformer & switchgears.
C04	Describe corrective and preventive maintenance of electrical equipment's.
C05	Explain the operation of an electrical equipment's such as isolators, circuit breakers, induction motor and synchronous machines
COURSE CODE	15EEL76 POWER SYSTEM SIMULATION LABORATORY
C01	Develop a program in MATLAB to assess the performance of medium and long transmission lines.

C02	Develop a program in MATLAB to obtain the power angle characteristics of salient and non-salient pole alternator.
C03	Develop a program in MATLAB to assess the transient stability under three phase fault at different locations in a of radial power systems.
C04	Develop programs in MATLAB to formulate bus admittance and bus impedance matrices of interconnected power systems.
C05	Use Mi-Power package to solve power flow problem for simple power systems.
C06	Use Mi-Power package to study unsymmetrical faults at different locations in radial power systems
C07	Use of Mi-Power package to study optimal generation scheduling problems for thermal power plants.
COURSE CODE	15EEL77 RELY AND HIGH VOLTAGE LABORATORY
C01	Experimentally verify the characteristics of over current, over voltage, under voltage and negative sequence relays both electromagnetic and static type.
C02	Experimentally verify the characteristics of microprocessor based over current, over voltage, under voltage relays and distance relay.
C03	Show knowledge of protecting generator, motor and feeders.
C04	Analyze the spark over characteristics for both uniform and non-uniform configurations using High AC and DC voltages.
C05	Measure high AC and DC voltages and breakdown strength of transformer oil.
C06	Draw electric field and measure the capacitance of different electrode configuration models.
C07	Show knowledge of generating standard lightning impulse voltage to determine efficiency, energy of impulse generator and 50% probability flashover voltage for air insulation.