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List of Course Outcomes for All Courses

Course Outcomes for 3rd Semester

Sub: Transform Calculus, Fourier Series and Numerical Techniques **Sub. Code:** 18MAT31

After successful completion of the course, the student will be able to:

CO	Description
C201.1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equationarising in network analysis, control systems and other fields of engineering.
C201.2	Demonstrate Fourier series to study the behavior of periodic functions and their applications insystem communications, digital signal processing and field theory.
C201.3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arisingin wave and heat propagation, signals and systems.
C201.4	Solve first and second order ordinary differential equations arising in engineering problemsusing single step and multistep numerical methods.
C201.5	Determine the externals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Sub: Electric Circuit Analysis **Sub. Code:** 18EE32

After successful completion of the course, the student will be able to:

CO	Description
C202.1	Explain the basic concepts, basic laws and methods of analysis of DC and AC networks and reduce the complexity of network using source shifting, source transformation and network reduction using transformations.
C202.2	Analyze complex electric circuits using network theorems.
C202.3	Discuss resonance in series and parallel circuits and also the importance of initial conditions and their evaluation.
C202.4	Analyze typical waveforms using Laplace transformation.
C202.5	Discuss unbalanced three phase systems and also evaluate the performance of two port networks.

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Sub: Transformers and Generator **Sub. Code:** 18EE33

After successful completion of the course, the student will be able to:

CO	Description
C203.1	Understand the construction and operation of 1-phase, 3-Phase transformers and Autotransformer.
C203.2	Analyze the performance of transformers by polarity test, Sumpner's Test, phase conversion, 3-phase connection, and parallel operation.
C203.3	Understand the construction and working of AC and DC Generators.
C203.4	Determine the regulation of AC Generator by EMF, MMF, and ZPF Methods.
C203.5	Analyze the performance of synchronous generators through power angle characteristics (salient and non salient pole), power angle diagram & reluctance power.

Sub: Analog Electronic Circuits **Sub. Code:** 18EE34

After successful completion of the course, the student will be able to:

CO	Description
C204.1	Obtain the output characteristics of clipper and clamper circuits.
C204.2	Design and compare biasing circuits for transistor amplifiers & explain the transistor switching.
C204.3	Explain the concept of feedback, its types and design of feedback circuits.
C204.4	Design and analyze the power amplifier circuits and oscillators for different frequencies.
C204.5	Design and analysis of FET and MOSFET amplifiers.

Sub: Digital System Design **Sub. Code:** 18EE35

After successful completion of the course, the student will be able to:

CO	Description
C205.1	Develop simplified switching equation using Karnaugh Maps and QuineMcClusky techniques.
C205.2	Design Multiplexer, Encoder, Decoder, Adder, Subtractors and Comparator as digital combinational control circuits.
C205.3	Design flip flops, counters, shift registers as sequential control circuits.
C205.4	Develop Mealy/Moore Models and state diagrams for the given clocked sequential circuits.
C205.5	Explain the functioning of Read only and Read/Write Memories, Programmable ROM, EPROM and Flash memory.

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Sub: Electrical & Electronic Measurements **Sub. Code:** 18EE36

After successful completion of the course, the student will be able to:

CO	Description
C206.1	Explain the measurement of resistance, inductance and capacitance using bridges and determine earth resistance.
C206.2	Discuss adjustments, calibration and errors in energy meters and Explain the construction and operation of power factor meter, frequency meter and phase sequence indicator.
C206.3	Explain measurements magnetic parameters; iron loss, air gap flux, field strength and Explain the methods of extending the range of instruments and instrument transformers.
C206.4	Discuss electronic and digital instruments used in measurements.
C206.5	Discuss display and recording devices used in measurements.

Sub: Electrical Machines Laboratory-I **Sub. Code:** 18EEL37

After successful completion of the course, the student will be able to:

CO	Description
C207.1	Evaluate the performance of transformers from the test data obtained.
C207.2	Connect and operate two single phase transformers of different KVA rating in parallel.
C207.3	Connect single phase transformers for three phase operation and phase conversion.
C207.4	Compute the voltage regulation of synchronous generator using the test data obtained in the
C207.5	Evaluate the performance of synchronous generators from the test data and assess the performance of synchronous generator connected to infinite bus.

Sub: Electronics Laboratory– I **Sub. Code:** 18EEL38

After successful completion of the course, the student will be able to:

CO	Description
C208.1	Design and test rectifier circuits with and without capacitor filters.
C208.2	Determine h-parameter models of transistor for all modes.
C208.3	Design and test BJT and FET amplifier and oscillator circuits.
C208.4	Realize Boolean expressions, adders and subtractors using gates.
C208.5	Design and test Ring counter/Johnson counter, Sequence generator and 3 bit counters.

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Course Outcomes for 4th Semester

Sub: Complex Analysis, Probability And Statistical Methods **Sub. Code:** 18MAT41

After successful completion of the course, the student will be able to:

CO	Description
C213.1	Use the concepts of analytic function and complex potentials to solve the problems arising in Electromagnetic field theory.
C213.2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow Visualization and image processing.
C213.3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
C213.4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the Statistical data.
C213.5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

Sub: Power Generation & Economics **Sub. Code:** 18EE42

After successful completion of the course, the student will be able to:

CO	Description
C214.1	Describe the working of hydroelectric, power plant and state functions of major equipment of the power plant.
C214.2	Describe the working of steam power plant and state functions of major equipment of power plant.
C214.3	Describe the working of Nuclear power plant and explain classification of Nuclear reactors.
C214.4	Classify various substations and explain the importance of grounding.
C214.5	Understand the economic aspects of power system operation, its effects and importance of power factor improvement.

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Sub: Transmission & Distribution **Sub. Code:** 18EE43

After successful completion of the course, the student will be able to:

CO	Description
C215.1	Explain the importance of HVAC, EHVAC, UHVAC and HVDC transmission. identify various types of conductors, Calculate sag for supports at equal & unequal levels. Explain properties of insulators, calculate string efficiency, explain various methods used to improve string efficiency.
C215.2	Calculate inductance, capacitance & of 1-ph & 3- ph transmission lines, define GMD & GMR.
C215.3	Calculate the parameters of the transmission line for different configurations and assess the performance of the line.
C215.4	Explain the phenomenon of Corona, advantages & disadvantages of Corona. Explain the construction & use of underground cables, explain the grading of cables.
C215.5	Explain various types of distribution systems, reliability and quality of distribution system.

Sub: Electric Motors **Sub. Code:** 18EE44

After successful completion of the course, the student will be able to:

CO	Description
C216.1	Explain the constructional features, characteristics, speed control of DC Motors and condition for maximum efficiency.
C216.2	Demonstrate & explain the methods of testing of DC machines.
C216.3	Explain the performance of Three Phase induction motor.
C216.4	Explain starting methods and speed control of induction motor by a suitable method & Explain the construction and operation of single phase induction & Motors.
C216.5	Explain the construction, operation and performance of synchronous motor. Discuss construction and operation of special motors; Universal motor, AC servomotor, Linear induction motor and stepper motor.

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Sub: Electromagnetic Field Theory **Sub. Code:** 18EE45

After successful completion of the course, the student will be able to:

CO	Description
C217.1	Use different coordinate systems, coulomb's Law and Gauss Law for the evaluation of electric fields produced by different charge configurations.
C217.2	Calculate the energy and potential due to a system of charges & Explain the behavior of electric field across boundary conditions.
C217.3	Explain Poison's , Laplace equations and behavior of steady magnetic field.
C217.4	Explain the behavior of magnetic fields and magnetic materials.
C217.5	Assess time varying fields and propagation of waves in different media.

Sub: Operational Amplifiers & Linear IC's **Sub. Code:** 18EE46

After successful completion of the course, the student will be able to:

CO	Description
C218.1	Describe the characteristics of ideal and practical operational `amplifier.
C218.2	Design filters and voltage regulators using Op-amp.
C218.3	Demonstrate the application of Linear ICs as comparators and rectifiers.
C218.4	Analyze voltage regulators for given specification using op-amp and IC voltage regulators.
C218.5	Summarize the basics of PLL and Timer.

Sub: Electrical Machines Laboratory -2 **Sub. Code:** 18EEL47

After successful completion of the course, the student will be able to:

CO	Description
C219.1	Test dc machines to determine their characteristics.
C219.2	Change the speed of dc motor by selecting suitable method.
C219.3	Pre-determine the performance characteristics of dc machines by conducting suitable tests.
C219.4	Assess the performance of single phase and three phase induction motor by conducting load test.
C219.5	Experiment with induction motor to pre-determine the performance characteristics.
C219.5	Test on synchronous motor to draw the performance curves.

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Sub: Operational Amplifier & Linear IC's Laboratory **Sub. Code:** 18EEL48

After successful completion of the course, the student will be able to:

CO	Description
C220.1	To conduct experiment to determine the characteristic parameters of Op-Amp.
C220.2	To design test the OP-Amp as Amplifier, Adder, Subtractor, Differentiator and Integrator.
C220.3	To design test the OP-Amp as oscillators and filters.
C220.4	To Design and study of Linear IC's as multivibrator power supplies.

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Course Outcomes for 5th Semester

Sub: Management and Entrepreneurship **Sub. Code:** 18EE51

After successful completion of the course, the student will be able to:

CO	Description
C301.1	Explain the field of management, task of the manager, planning and steps in decision making.
C301.2	Discuss the structure of organization, importance of staffing, leadership styles, modes of communication techniques of coordination and importance of managerial control in business.
C301.3	Explain the concepts of entrepreneurship and a businessman's social responsibilities towards different groups.
C301.4	Explain the social responsibility of business and leadership and discuss role of SSI's in the development of country and state/central level institutions/agencies supporting business enterprises.
C301.5	Discuss the concepts of project management, capital budgeting, project feasibility studies, need for project report and new control techniques

Sub: Microcontroller **Sub. Code:** 18EE52

After successful completion of the course, the student will be able to:

CO	Description
C302.1	Discuss the history, features, internal architecture and addressing modes of 8051.
C302.2	Write assembly level program using arithmetic, logic, jump and call instructions.
C302.3	Develop 8051C programs for time delay, I/O, logic, data conversion/serialization and timer operation.
C302.4	Develop 8051 serial port and interrupt programming in assembly and C.
C302.5	Interface 8051 with real-world devices such as LCD's, keyboards, ADC, DAC chips, sensors, motor control devices and with 8255.

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Sub: Power Electronics **Sub. Code:** 18EE53

After successful completion of the course, the student will be able to:

CO	Description
C303.1	Explain application areas of power electronics, types of power electronic circuits and switches, their characteristics and specifications.
C303.2	Explain different types of power diodes, its effects on RL circuits and operation and analysis of single phase diode rectifier circuits.
C303.3	Explain steady state, switching characteristics and gate control requirements of different power transistors and their comparison.
C303.4	Discuss different types of thyristors, their operation, characteristics and firing circuits.
C303.5	Discuss the principle of operation and analysis of controlled rectifiers, AC voltage controllers, DC – DC and DC –AC converters.

Sub: Signals and Systems **Sub. Code:** 18EE54

After successful completion of the course, the student will be able to:

CO	Description
C304.1	Explain the classifications, basic operations of signals and properties of systems.
C304.2	Apply convolution in both continuous and discrete domain for the analysis of systems given impulse response of a system.
C304.3	Solve the continuous time and discrete time systems by various methods and their representation by block diagram.
C304.4	Perform Fourier analysis for continuous and discrete time, linear time invariant systems.
C304.5	Apply Z-transform and properties of Z transform for the analysis of discrete time systems.

Sub: Electrical Machine Design **Sub. Code:** 18EE55

After successful completion of the course, the student will be able to:

CO	Description
C305.1	Discuss design factors, limitations, modern trends in design, manufacturing of electrical machines and properties of materials used in the electrical machines.
C305.2	Design different parts of DC machines.
C305.3	Design single phase and three phase transformers.
C305.4	Design three phase Induction motors.
C305.5	Design three phase Synchronous machines.

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Sub: High Voltage Engineering **Sub. Code:** 18EE56

After successful completion of the course, the student will be able to:

CO	Description
C306.1	Examine conduction and breakdown phenomenon in gases, liquid and solid dielectrics.
C306.2	Illustrate various techniques of generation of different forms of high voltages and currents
C306.3	Outline measurement techniques for high voltages and currents.
C306.4	Analyze overvoltage phenomenon and insulation coordination in electric power systems.
C306.5	Illustrate non-destructive testing of materials and electric apparatus and high voltage testing of electric apparatus.

Sub: Microcontroller Laboratory **Sub. Code:** 18EEL57

After successful completion of the course, the student will be able to:

CO	Description
C307.1	Write assembly language programs for data transfer, arithmetic, Boolean and logical instructions.
C307.2	Write ALP for code conversions
C307.3	Write ALP using subroutines for generation of delays, counters, configuration of SFRs for serial communication and timers.
C307.4	Perform interfacing of stepper motor and dc motor for controlling the speed
C307.5	Generate different waveforms using DAC interface.
C307.6	Perform interfacing of LCD, Elevator, ADC and temperature controller to 8051.

Sub: Power Electronics Laboratory **Sub. Code:** 18EEL58

After successful completion of the course, the student will be able to:

CO	Description
C308.1	Analyze the static characteristics of semiconductor devices to discuss their performance.
C308.2	Experiment with different methods of triggering the SCR.
C308.3	Verify the performance of single phase controlled full wave rectifier and AC voltage controller with different types of load conditions.
C308.4	Determine the speed control of a stepper motor, universal motor and DC motors using different types of converter.
C308.5	Experiment with single phase MOSFET/IGBT based PWM inverter.

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Sub: Environmental Studies **Sub. Code:** 18CIV59

After successful completion of the course, the student will be able to:

CO	Description
C309.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.
C309.2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
C309.3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
C309.4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
C309.5	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.

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Course Outcomes for 6th Semester

Sub: Control Systems **Sub. Code:** 18EE61

After successful completion of the course, the student will be able to:

CO	Description
C310.1	Demonstrate the mathematical modelling of electrical, mechanical and analogous systems.
C310.2	Apply block diagram and signal flow graph methods to obtain transfer function of systems.
C310.3	Determine transient and steady state time response of a simple control system& investigate the performance of a given system in time and frequency domains.
C310.4	Determine the stability of the system by using Routh criterion, root locus, bode plot and Nyquist plot methods.
C310.5	Design control system using different controllers.

Sub: Power System Analysis-1 **Sub. Code:** 18EE62

After successful completion of the course, the student will be able to:

CO	Description
C311.1	Model the power system components & construct per unit impedance diagram of power system.
C311.2	Analyze three phase symmetrical faults on power system.
C311.3	Compute unbalanced phasors in terms of sequence components and vice versa, also develop sequence networks.
C311.4	Analyze various unsymmetrical faults on power system.
C311.5	Examine dynamics of synchronous machine and determine the power system stability.

Sub: Digital Signal Processing **Sub. Code:** 18EE63

After successful completion of the course, the student will be able to:

CO	Description
C312.1	Evaluate the DFT of various signals using its properties and linear filtering of two sequences.
C312.2	Apply fast and efficient algorithms for computing DFT and inverse DFT of a given sequence.
C312.3	Design digital IIR filters by using different transformation techniques.
C312.4	Design digital FIR filters using different sampling techniques.
C312.5	Model digital filters using different realization methods.

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Sub: Sensors and Transducers **Sub. Code:** 18EE647

After successful completion of the course, the student will be able to:

CO	Description
C319.1	Use gauges and transducers to measure pressure, direction and distance.
C319.2	Discuss the use of light transducers and other devices used for the measurement of electromagnetic radiations.
C319.3	Explain the working of different temperature sensing devices.
C319.4	Discuss the principles and applications of audio electrical sensors and transducers used for the measurement of sound.
C319.5	Discuss the use of sensors for the measurement of mass, volume and environmental quantities.

Sub: Non-Conventional Energy Sources **Sub. Code:** 18ME651

After successful completion of the course, the student will be able to:

CO	Description
C317.1	Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations.
C317.2	Know the need of renewable energy resources, historical and latest developments.
C317.3	Describe the use of solar energy and the various components used in the energy production with respect to applications like-heating, cooling, desalination, power generation, drying, cooking etc.
C317.4	Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.
C317.5	Understand the concept of Biomass energy resources and their classification, types of biogas Plants- applications.
C317.6	Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations.
C318.6	Acquire the knowledge of fuel cells, wave power, tidal power and geothermal principles and applications.

Sub: Programming In Java **Sub. Code:** 18CS653

After successful completion of the course, the student will be able to:

CO	Description
C320.1	Explain the object-oriented concepts and JAVA.
C320.2	Develop computer programs to solve real world problems in Java.
C320.3	Develop simple GUI interfaces for a computer program to interact with users.

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Sub: Control System Lab **Sub. Code:** 18EEL66

After successful completion of the course, the student will be able to:

CO	Description
C324.1	Determine the speed – torque characteristics of a D.C. and A.C. servomotor & Synchro pair characteristics.
C324.2	Determine time response characteristics of a second order system using MATLAB and frequency response characteristics of a second order system using MATLAB and experimental setup and evaluate time and frequency domain specifications.
C324.3	Design passive RC lead, lag, lead-lag compensating network for given specifications and determine the frequency response characteristics of the same using MATLAB and experimental setup.
C324.4	Determine the effect of P, PI, PD and PID controller on the step response of a feedback control system using MATLAB and experimental setup.
C324.5	Demonstrate a DC position control system by using MATLAB and determine its step response.
C324.6	Examine the stability of a system by root locus, bode plot and Nyquist plot methods, verify and compare the same by using MATLAB.

Sub: Digital Signal Processing Lab **Sub. Code:** 18EEL67

After successful completion of the course, the student will be able to:

CO	Description
C325.1	Explain physical interpretation of sampling theorem in time and frequency domains.
C325.2	Evaluate the impulse response of a system.
C325.3	Perform convolution of given sequences to evaluate the response of a system.
C325.4	Compute DFT and IDFT of a given sequence using the basic definition and/or fast methods.
C325.5	Develop solution for a given difference equation.
C325.6	Design and implement IIR and FIR filters.

Sub: Mini-Project **Sub. Code:** 18EEP68

After successful completion of the course, the student will be able to:

CO	Description
C326.1	Demonstrate the knowledge of engineering fundamentals to identify, formulate and solve engineering problems.
C326.2	Present the project and be able to defend it.
C326.3	Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
C326.4	habituated to critical thinking and use problem solving skills
C326.5	Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.
C326.6	Work in a team to achieve common goal.
C326.7	Learn on my own and take appropriate actions.

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Course Outcomes for 7th Semester

Sub: Power System Analysis – II **Sub. Code:** 18EE71

After successful completion of the course, the student will be able to:

CO	Description
C401.1	Formulate network matrices and models for solving load flow problems.
C401.2	Perform steady state power flow analysis of power systems using numerical iterative techniques.
C401.3	Solve issues of economic load dispatch and unit commitment problems.
C401.4	Analyze short circuit faults in power system networks using bus impedance matrix.
C401.5	Discuss optimal scheduling for hydro-thermal system, power system security and reliability.
C401.6	Apply Point by Point method and Runge Kutta Method to solve Swing Equation.

Sub: Power System Protection **Sub. Code:** 18EE72

After successful completion of the course, the student will be able to:

CO	Description
C402.1	Discuss performance of protective relays, components of protection scheme.
C402.2	Explain the working of distance relays and the effects of arc resistance, power swings, line length and source impedance on performance of distance relays.
C402.3	Discuss various Pilot protection schemes, protection of generators, motors, Transformers and construction, operating principles, performance of differential relays for differential protection.
C402.4	Explain the principle of circuit interruption in different types of circuit breakers.
C402.5	Describe the construction and operating principle of different types of fuses and modern trends in power system protection.

Sub: Micro- and Nano-Scale Sensors Transducers **Sub. Code:** 18EE732

After successful completion of the course, the student will be able to:

CO	Description
C404.1	Explain the differences between the sensor and transducer technology based on nanotechnology, nanofabrication and the classical sensor technologies.
C404.2	Develop an informed selection of a sensor or transducer for a particular application.
C404.3	Analyze the technologies that are available commercially at the present time.

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Sub: Utilization of Electrical Power **Sub. Code:** 18EE742

After successful completion of the course, the student will be able to:

CO	Description
C409.1	Discuss different methods of electric heating & welding, laws of electrolysis, extraction, refining of metals and electro deposition process.
C409.2	Discuss the laws of illumination, different types of lamps, lighting schemes and design of lighting systems.
C409.3	Analyze systems of electric traction, speed time curves and mechanics of train movement.
C409.4	Explain the motors used for electric traction, their control & braking and power supply system used for electric traction.
C409.5	Explain the working of electric and hybrid electric vehicles.

Sub: Power system Simulation Laboratory **Sub. Code:** 18EEL76

After successful completion of the course, the student will be able to:

CO	Description
C417.1	Develop a program in MATLAB to assess the performance of medium and long transmission lines.
C417.2	Develop a program in MATLAB to obtain the power angle characteristics of salient and non-salient pole alternator.
C417.3	Develop a program in MATLAB to assess the transient stability under three phase fault at different locations in a of radial power systems.
C417.4	Develop programs in MATLAB to formulate bus admittance and bus impedance matrices of interconnected power systems.
C417.5	Use Mi-Power package to solve power flow problem for simple power systems.
C417.6	Use Mi-Power package to study unsymmetrical faults at different locations in radial power systems.
C417.7	Use of Mi-Power package to study optimal generation scheduling problems for thermal power plants.

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Sub: Rely and High Voltage Laboratory **Sub. Code:** 18EEL77

After successful completion of the course, the student will be able to:

CO	Description
C418.1	Experimentally verify the characteristics of over current, over voltage, under voltage and negative sequence relays of both electromagnetic and static type.
C418.2	Experimentally verify the characteristics of microprocessor based over current, over voltage, under voltage relays and distance relay.
C418.3	Justify knowledge of protection schemes of generator, motor and feeders.
C418.4	Analyze the spark over characteristics for both uniform and non-uniform field configurations using High voltage AC and DC.
C418.5	Measure high AC and DC voltages and breakdown strength of transformer oil.
C418.6	Draw electric field lines and measure the capacitance of different electrode configuration models.
C418.6	Justify knowledge of generating standard lightning impulse voltage to determine efficiency, energy of impulse generator and 50% probability flashover voltage for air insulation.

Sub: Project Phase – I **Sub. Code:** 18EEP78

After successful completion of the course, the student will be able to:

CO	Description
C419.1	Demonstrate a sound technical knowledge of their selected project topic.
C419.2	Undertake problem identification, formulation and solution.
C419.3	Design engineering solutions to complex problems utilizing a systems approach.
C419.4	Communicate with engineers and the community at large in written an oral forms.

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Course Outcomes for 8th Semester

Sub: Power System Operation & Control **Sub. Code:** 18EE81

After successful completion of the course, the student will be able to:

CO	Description
C420.1	Describe various levels of controls in power systems, architecture and configuration of SCADA.
C420.2	Develop and analyze mathematical models of Automatic Load Frequency Control.
C420.3	Develop mathematical model of Automatic Generation Control in Interconnected Power system.
C420.4	Discuss the Control of Voltage, Reactive Power and Voltage collapse.
C420.5	Explain security, contingency analysis, state estimation of power systems.

Sub: Electrical Estimation and Costing **Sub. Code:** 18EE822

After successful completion of the course, the student will be able to:

CO	Description
C422.1	Explain the architectural design, Communication and measurement technology and performance analysis tools for smart grid.
C422.2	Discuss various stability analysis tools for smart grid..
C422.3	Explain computational tools and pathway/barrier for smart grid design.
C422.4	Develop cleaner, more environmentally responsible technologies for the electric system.
C422.5	Explain methods to promote smart grid awareness and making the existing transmission system smarter by investing in new technology.

Sub: Big Data Analytics in Power Systems **Sub. Code:** 18EE823

After successful completion of the course, the student will be able to:

CO	Description
C423.1	Discuss role of big data and machine-learning methods applicable to power systems and in particular to Smart Grid communications.
C423.2	Discuss optimization methods which are suitable for big data models in power systems.
C423.3	Discuss various cyber security issues, electricity theft detection and mitigation that exist in IoT-enabled future power systems.
C423.4	Discuss renewable energy planning concerns associated with planned future power systems that have high renewable penetration.
C423.5	Discuss various methods for transformer differential Protection.

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Sub: Project Work Phase – II **Sub. Code:** 18EEP83

After successful completion of the course, the student will be able to:

CO	Description
C426.1	Demonstrate the knowledge of engineering fundamentals to identify, formulate and solve engineering problems.
C426.2	Present the project and be able to defend it.
C426.3	Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
C426.4	habituated to critical thinking and use problem solving skills
C426.5	Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.
C426.6	Work in a team to achieve common goal.
C426.7	Learn on my own and take appropriate actions.

Sub: Technical Seminar **Sub. Code:** 18EES84

After successful completion of the course, the student will be able to:

CO	Description
C427.1	Use and develop knowledge in the field of engineering and other disciplines through independent learning and collaborative study.
C427.2	Identify, understand and discuss current, real-time issues.
C427.3	Improve oral and written communication skills.
C427.4	Explore an appreciation of the self in relation to its larger diverse social and academic contexts.
C427.5	Apply principles of ethics and respect in interaction with others.

Sub: Internship **Sub. Code:** 18EEI85

After successful completion of the course, the student will be able to:

CO	Description
C428.1	Gain practical experience within industry in which the internship is done.
C428.2	Acquire knowledge of the industry in which the internship is done.
C428.3	Apply knowledge and skills learned to classroom work.
C428.4	Develop a greater understanding about career options while more clearly defining personal career goals.
C428.5	Experience the activities and functions of professionals.
C428.6	Develop and refine oral and written communication skills.