



SAPTHAGIRI COLLEGE OF ENGINEERING

(Affiliated to Visvesvaraya Technological University, Belgaum,

Approved by AICTE, New Delhi)

14/5, Chikkasandra, Hesaraghatta Main Road,

Bengaluru – 560 057

Department of Electrical and Electronics Engineering

COURSE OUTCOMES-2018 SCHEME

SUBJECT: TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES-18MAT31

Course Outcomes:	CO1:	Find the Fourier series, half range Fourier series and Fourier coefficients of periodic functions													
	CO2:	Find the Fourier and inverse Fourier transforms of a periodic functions													
	CO3:	Solve the finite difference equations using Z-transforms													
	CO4:	Apply the concept of statistics for curve fitting, correlation and regression													
	CO5:	Analyze and apply proper numerical techniques to solve the algebraic/transcendental equation, to find polynomials, intermediate values and evaluation of integrals													
	CO6	Find the integrals using Green's, Stokes and Gauss divergence theorem and external of a functional													
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	2	-	2	-
CO2	3	2	-	-	-	-	-	-	-	-	-	2	-	2	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	2	-	2	-
CO5	3	2	-	-	-	-	-	-	-	-	-	2	-	2	-
CO6	2	2	-	-	-	-	-	-	-	-	-	2	-	1	-

SUBJECT: ELECTRIC CIRCUIT ANALYSIS-18EE32

Course Outcomes:	CO1:	Analyze the electric circuit with different technique.													
	CO2:	Apply network theorems in electric circuits													
	CO3:	Examine the resonance condition of parallel and series RLC circuits.													
	CO4:	Determine the transient behavior of networks													
	CO5:	Evaluate the two port parameters and unbalanced three phase systems													
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-

SUBJECT: TRANSFORMERS AND GENERATORS 18EE33

Course Outcomes:	CO1:	Explain construction and operation of single phase, three phase and auto transformer.													
	CO2:	Analyze the performance of single phase and three phase transformer.													
	CO3:	Explain the construction of DC generator and Synchronous generators.													
	CO4:	Analyze the performance of salient and Non-salient pole generators.													
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-

SUBJECT: ANALOG ELECTRONICS CIRCUITS 18EE34																
Course Outcomes:	CO1: Design diode circuits and transistor biasing. CO2: Analyze the performance of transistor amplifier circuits. CO3: Analyze multi-stage and feedback amplifiers. CO4: Design the power amplifiers and oscillators. CO5: Design amplifiers using JFET/MOSFET.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	2	3	3	-	-	-	-	-	-	-	-	-	3	-	-
	CO2	2	3	3	-	-	-	-	-	-	-	-	-	3	-	-
	CO3	-	2	3	-	-	-	-	-	-	-	-	-	3	-	-
	CO4	-	2	3	-	-	-	-	-	-	-	-	-	3	-	-
	CO5	-	3	3	-	-	-	-	-	-	-	-	-	3	-	-

SUBJECT: DIGITAL SYSTEM DESIGN -18EE35																
Course Outcomes:	CO1: Develop simplified switching equation using Karnaugh Maps and QuineMcClusky techniques. CO2: Design Multiplexer, Encoder, Decoder, Adder, Subtractors and Comparator as digital combinational control circuits. CO3: Design latch and flip flops, their characteristic equations CO4: Develop counters, shift registers as sequential control circuits. and state diagrams for the given clocked sequential circuits. CO5: Develop Mealy/Moore Models and illustrate the functioning of Read only and Read/Write Memories, Programmable ROM, EPROM and Flash memory.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
	CO2	2	3	3	-	-	-	-	-	-	-	-	-	2	-	-
	CO3	2	2	3	-	-	-	-	-	-	-	-	-	2	-	-
	CO4	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO5	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-

SUBJECT: ELECTRICAL & ELECTRONICS MEASUREMENTS -18EE36																
Course Outcomes:	CO1: Determine the resistance, inductance and capacitance using bridges and also determine earth resistance. CO2: Explain the various meters used for measurement of Power & Energy. CO3: Explain the calibration & errors in energy meters & also methods of extending the range of instruments & instrument transformers. CO4: Examine the working of different electronic& digital instruments. CO5: Analyze various display devices and recording mechanisms															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO2	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO3	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO4	2	2	-	-	-	-	-	-	-	-	-	-	2	-	3
	CO5	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-

SUBJECT: ELECTRICAL MACHINES LAB 1 -18EEL37	
Course Outcomes:	CO1: Evaluate the performance of transformers from the test data obtained CO2: Operate two single phase transformers of different KVA rating in parallel. CO3: Build the three phase operation and phase conversion using single phase transformers. CO4: Compute the voltage regulation of synchronous generator using the test data obtained in the laboratory

Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	-	2	-	-	-	-	3	2	-	-	3	-	2
CO2	-	3	-	2	-	-	-	-	3	2	-	-	3	-	2
CO3	-	3	-	2	-	-	-	-	3	2	-	-	3	-	2
CO4	-	3	-	2	-	-	-	-	3	2	-	-	3	-	2

SUBJECT: ELECTRONICS LAB -18EEL38

Course Outcomes:	CO1: Design and test different diode circuits. CO2: Experiment with amplifier and oscillator circuits to analyze their performance. CO3: Examine the universal gates and ICs for code conversion and arithmetic operations. CO4: Design and verify different counters															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	-	3	3	-	-	-	-	-	3	3	-	-	2	2	2
	CO2	-	3	-	-	-	-	-	-	3	3	-	-	3	-	2
	CO3	-	3	-	-	-	-	-	-	2	3	-	-	3	-	2
	CO4	-	3	3	-	-	-	-	-	3	3	-	-	3	-	2

SUBJECT: AADALITHA KANNADA - 18KAK39

Course Outcomes:	CO1: Make use of kannada language and understand usage. CO2: Use the language grammatically and utilize the same for writing essay and report. CO3: Apply the knowledge of kannada for writing CV and understand the government circular.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
	CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
	CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-

SUBJECT: VYAVAHARIKA KANNADA - 18KVK39

Course Outcomes:	CO1: Read and understand the simple words in kannada language CO2: Make use of kannada language for communication.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-

SUBJECT: COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS -18MAT41

Course Outcomes:	CO1: Apply appropriate numerical methods to solve ordinary differential equations CO2: Derive and Apply Bessel's function, Legendre's polynomials & Rodrigue's formula, and its properties. CO3: Solve problems on analytic functions using Cauchy–Riemann equations, complex line integrals, conformal and bilinear transformations. CO4: Analyze and solve the probability distribution problems. CO5: Analyze and interpret the hypothesis for the given sampling distribution and to solve stochastic process problems.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	2	-	-	-	-	-	-	-	-	-	2	-	2	-
	CO2	3	1	-	-	-	-	-	-	-	-	-	2	-	1	-
	CO3	3	1	-	-	-	-	-	-	-	-	-	2	-	2	-
	CO4	3	2	-	-	-	-	-	-	-	-	-	2	-	2	-
	CO5	3	2	-	-	-	-	-	-	-	-	-	2	-	2	-

SUBJECT: POWER GENERATION AND ECONOMICS -18EE42

CO1: Classify and explain the working of hydroelectric power plants.

Course Outcomes:	CO2:	Explain the working of steam power plants, diesel power plants and gas turbine power plants.														
	CO3:	Illustrate the working of nuclear power plants.														
	CO4:	Classify various substations and explain the importance of grounding.														
	CO5:	Compute various economic factors of power system operation including the power factor improvement														
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	2	2	-	-	-	-	-	-	3	-	2
CO2	2	-	-	-	-	2	2	-	-	-	-	-	-	3	-	2
CO3	2	-	-	-	-	2	3	-	-	-	-	-	-	3	-	2
CO4	3	-	-	-	-	2	2	-	-	-	-	-	-	3	-	2
CO5	3	2	-	-	-	3	-	-	-	-	-	-	2	3	-	3

SUBJECT: TRANSMISSION AND DISTRIBUTION -18EE43

Course Outcomes:	CO1:	Explain the concepts and importance of HVAC, HVDC, EHVAC and UHVAC transmission systems and its components.													
	CO2:	Determine inductance and capacitance of overhead transmission lines.													
	CO3:	Determine the parameters of the transmission line for different configurations and asses the performance of line.													
	CO4:	Explain the effect of corona and use of underground cables.													
	CO5:	Explain different types and reliability of AC distribution system.													
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	-	2	3	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	2	3	-	-	-	2	3	-	-	-	-	-	2	-	2
CO5	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-

SUBJECT: ELECTRIC MOTOR-18EE44

SUBJECT: FIELD THEORY -18EE45

Course Outcomes:	CO1: Explain the concept of gradient, divergence , curl of a vector.
	CO2: Explain Coulomb's Law and Gauss Law for the evaluation of electric fields produced by different charge configurations.
	CO3: Determine the energy and potential due to a system of charges.
	CO4: Illustrate the behavior of electric field across a boundary between a conductor and dielectric and between two different dielectrics.
	CO5: Evaluate the behavior of magnetic fields and magnetic materials.

	CO6 Assess time varying fields and propagation of waves in different media.														
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO6	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-

SUBJECT: OP-AMPS & LINEAR ICS- 18EE46																
Course Outcomes:	CO1: Explain the operation and application of Op-Amp and DC Voltage Regulators CO2: Design Active Filters, Signal Generators using Op-Amps. CO3: Analyze various types of Comparators and converters using op-amps CO4: Analyse various Signal Processing circuits, A/D and D/A converters. CO5: Explain the operation of Phase Locked Loop (PLL) and Timer ICs (555Timer)															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO2	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
	CO3	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO4	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO5	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-

SUBJECT: ELECTRIC MACHINE LAB 2- 18EEL47																
Course Outcomes:	CO1: Demonstrate the speed control of DC machines CO2: Determine the performance characteristics of dc machines by conducting suitable tests CO3: Analyse the performance of single phase and three phase induction motor CO4: Test induction motor to pre-determine the performance characteristics. CO5: Evaluate performance of synchronous motor to draw the characteristics curves.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	-	3	-	-	-	-	-	-	2	2	-	-	2	-	-
	CO2	-	3	-	-	-	-	-	-	2	2	-	-	3	-	-
	CO3	-	3	-	-	-	-	-	-	2	2	-	-	2	-	-
	CO4	-	3	-	-	-	-	-	-	2	2	-	-	2	-	-
	CO5	-	3	-	-	-	-	-	-	2	2	-	-	2	-	-

SUBJECT: OP-AMP & LIC LAB -18EEL48																
Course Outcomes:	CO1: Determine the characteristics parameters of op-amp practically like Gain, Frequency response. CO2: Design adder, subtractor, differentiator and integrator using op-amp and test the performance. CO3: Analyse Oscillator and filters using op-amp and test its performance CO4: Design Multivibrator and power supply using linear IC'S like 555 timer and IC Regulator to test its performance															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	-	2	2	-	-	-	-	-	2	2	-	-	3	-	-
	CO2	-	3	3	-	-	-	-	-	2	2	-	-	3	-	-
	CO3	-	3	3	-	-	-	-	-	2	2	-	-	3	-	-
	CO4	-	3	3	-	-	-	-	-	2	2	-	-	3	-	-

SUBJECT: CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW - 18CPC49																
Course Outcomes:	CO1: Manage complex societal issues in society using general knowledge and legal literacy about Indian Constitution. CO2: Understand Engineering and Professional ethics and responsibilities of Engineers. CO3: Understand the the cybercrimes and cyber laws for cyber safety measures.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	-	-	-	-	-	3	-	-	-	-	-	2	-	-	-
CO2	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-

SUBJECT: MANAGEMENT AND ENTREPRENEURSHIP-18EE51																
Course Outcomes:	CO1: Explain the field of management, task of the manager, planning and steps in decision making. CO2: Discuss the structure of organization, importance of staffing, leadership styles, modes of communication, and techniques of coordination and importance of managerial control in business. CO3: Explain the concepts of entrepreneurship and a businessman's social responsibilities towards different groups. CO4: Illustrate the role of SSI's in the development of country and state/central level institutions/agencies supporting business enterprises. CO5: Discuss the concepts of project management, capital budgeting, project feasibility studies, need for project report and new control techniques.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	-	-	-	-	-	-	3	2	3	-	2	-	-	2	
	CO2	-	-	-	-	-	2	-	2	3	3	-	2	-	-	2
	CO3	-	-	-	-	-	3	-	2	3	2	-	2	-	-	2
	CO4	-	-	-	-	-	-	-	2	2	2	-	3	-	-	2
CO5	-	-	-	-	-	-	-	2	3	3	2	2	-	-	-	2

SUBJECT: MICROCONTROLLER -18EE52																
Course Outcomes:	CO1: Discuss the internal architecture, addressing modes of 8051 CO2: Utilize the concept of assembler, stack, flag register, loop, jump and call instructions to write assembly language program. CO3: Develop 8051C programs for time delay, I/O bit manipulation, logic and arithmetic operations, data conversion and data serialization CO4: Make use of the hardware connection of 8051 chip for programming its timers, serial ports and interrupts CO5: Explain the Interfacing of 8051 with real-world devices.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	2	-	-	-	-	-	-	-	-	-	-	2	2	-	-
	CO2	2	2	-	-	2	-	-	-	-	-	-	2	2	2	-
	CO3	3	2	-	-	2	-	-	-	-	-	-	2	2	2	-
	CO4	3	2	-	-	-	-	-	-	-	-	-	2	2	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	2	2	-	-

SUBJECT: POWER ELECTRONICS -18EE53																
Course Outcomes:	CO1: Explain the concepts of Power diodes and Diode rectifiers. CO2: Explain the switching characteristics and gate control requirement of transistor. CO3: Classify the types of thyristor operation, gate characteristics and applications. CO4: Discuss the thyristor controlled Rectifiers with different loads. CO5: Explain the operation of single phase and 3 phase converter and controllers.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	-	-	-	-	-	-	-	-	-	-	-	2	-	-	
	CO2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	
	CO3	-	-	-	-	-	-	-	-	-	-	-	2	-	-	
	CO4	-	-	-	-	-	-	-	-	-	-	-	2	-	-	
CO5	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	

Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	2	2	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	2	2	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	2	2	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	2	-	2
CO5	2	2	-	-	-	-	-	-	-	-	-	-	2	-	2
CO6															

SUBJECT: SIGNALS AND SYSTEMS -18EE54																
Course Outcomes:	CO1: Classify signals, relate between elementary signals and identify the properties of system CO2: Solve convolution operation, realize LTI System by differential and difference Equations. CO3: Explain the properties of CT and DT Fourier Transform and its applications. CO4: Analyze the properties of Z transform and its applications.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	2	3	-	-	-	-	-	-	-	-	-	2	2	-	-
	CO2	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO3	3	3	-	-	2	-	-	-	-	-	-	-	2	-	-
CO4	2	3	-	-	2	-	-	-	-	-	-	-	-	2	-	-

SUBJECT: ELECTRICAL MACHINE DESIGN -18EE55																
Course Outcomes:	CO1: Judge and select the engineering material for the construction of electrical machines. CO2: Estimate the dimensions of DC machine armature with the help of output equation and relationship between various parameters. CO3: Determine the dimensions of field and commutator. CO4: Estimate the dimensions of transformer with the help of output equation and relationship between various parameter. CO5: Determine the dimensions of AC machine with the help of output equation and relationship between various parameters. CO6: Design the field of synchronous machines define SCR, effect of SCR and then estimate the air gap length.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	2	3	-	-	-	-	-	-	-	-	-	-	2	-	3
	CO2	2	3	3	-	-	-	-	-	-	-	-	-	2	-	3
	CO3	2	3	3	-	-	-	-	-	-	-	-	-	2	-	3
	CO4	2	3	3	-	-	-	-	-	-	-	-	-	2	-	3
	CO5	2	3	3	-	-	-	-	-	-	-	-	-	2	-	3
CO6	2	3	3	-	-	-	-	-	-	-	-	-	-	2	-	3

SUBJECT: HIGH VOLTAGE ENGINEERING-18EE56																
Course Outcomes:	CO1: Explain breakdown phenomenon in gas, liquid and solid dielectrics. CO2: Discuss the generation of high voltages and currents. CO3: Analyze measurement techniques of high voltages and currents CO4: Explain overvoltage phenomenon and insulation coordination in electric power systems CO5: Analyze non-destructive testing of materials and electric apparatus and high-voltage testing of electric apparatus															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	-	2
	CO2	2	3	-	-	-	-	-	-	-	-	-	-	2	3	-

CO3	2	3	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-	2	3	-	-

SUBJECT: MICROCONTROLLER LAB -18EEL57																
Course Outcomes:	CO1: Build assembly language programs for data transfer, arithmetic, Boolean and logical instructions and code conversions. CO2: Apply ALP subroutines for generation of delays, counters, configuration of SFRs for serial communication and timers. CO3: Demonstrate interfacing of LCD, stepper motor and dc motor for controlling the speed. CO4: Develop different waveforms using DAC interface.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	-	-	2	-	3	-	-	-	2	2	-	2	2	3	-
	CO2	-	-	2	-	3	-	-	-	2	2	-	2	2	3	-
	CO3	-	-	3	-	3	-	-	-	3	2	-	2	2	3	-
	CO4	-	-	3	-	3	-	-	-	3	2	-	2	2	3	-

SUBJECT: POWER ELECTRONICS LAB-18EEL58																
Course Outcomes:	CO1: Demonstrate the performance of various semiconductor devices with the help of their static characteristics. CO2: Design the Trigger circuit for SCR by different methods. CO3: Demonstrate the operation of single phase controlled full wave rectifier and AC voltage controller with R and RL loads. CO4: Demonstrate the speed control of dc motor, universal motor and stepper motors. CO5: Demonstrate the performance of PWM inverter.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	-	-	2	-	-	-	-	-	2	3	-	2	3	-	-
	CO2	-	-	3	-	-	-	-	-	3	3	-	-	3	-	-
	CO3	-	-	3	-	-	-	-	-	2	3	-	2	3	-	-
	CO4	-	-	2	-	-	-	-	-	2	3	-	-	3	-	-
	CO5	-	-	2						3	3		2	3	-	-

SUBJECT: CONTROL SYSTEMS -18EE61																
Course Outcomes:	CO1: Determine the transfer function of a linear time invariant system. CO2: Apply block diagram manipulation techniques and signal flow graph to obtain transfer function of LTI systems. CO3: Analyze time response of first and second order control systems. CO4: Evaluate the stability of LTI systems using RH criterion, Root locus, Bode plots and Nyquist plots. CO5: Design of PD, PI & PID controllers.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
	CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
	CO3	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO4	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
	CO5	2	2	3	-	-	-	-	-	-	-	-	-	2	-	-

SUBJECT: POWER SYSTEM ANALYSIS 1- 18EE62															
Course Outcomes:	CO1: Illustrate the single line diagram of the power system in per unit.														
	CO2: Identify and analyse symmetrical faults in power system.														
	CO3: Analyze various unsymmetrical faults by resolving unbalanced phasors into symmetrical components.														
	CO4: Evaluate power system stability in graphical method using the concept of power system stability.														
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	2	3	-	3	-	-	-	-	-	-	-	-	2	3	-

SUBJECT: DIGITAL SIGNAL PROCESSING -18EE63																
Course Outcomes:	CO1: Classify the DFT of various signals using its properties and by its different methods. CO2: Apply fast and efficient algorithms to compute DFT and IDFT of a finite sequence. CO3: Design analog and digital IIR filters using Impulse invariant technique and Bilinear transformation. CO4: Design FIR filters using window techniques and frequency sampling technique. CO5: Analyze IIR and FIR filters by direct form-1, direct form –II,Cascade and Parallel realizations.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO2	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
	CO3	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
	CO4	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
	CO5	2	3	-	-	-	-	-	-	-	-	-	-	2	-	-

SUBJECT: INTRODUCTION TO NUCLEAR POWER - 18EE641																
Course Outcomes:	CO1: Describe the fission process in nuclear materials, basic components of nuclear reactors, types of nuclear reactors and their working. CO2: Classify different types of coolants, their features, and cooling of reactors CO3: Explain loss of cooling accidents in different reactors. CO4: Explain postulated severe accidents in reactors and cooling of reactor during removal of spent fuel. CO5: Describe the methods of cooling and disposing the nuclear waste and prospect of fusion energy in the future.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-

CO2	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-
CO3	2	-	-	-	-	-	2	-	-	-	-	-	2	-	-
CO4	2	-	-	-	-	2	2	-	-	-	-	-	2	-	-
CO5	2	-	-	-	-	2	2	-	-	-	-	-	2	-	-

Subject: ELECTRICAL ENGINEERING MATERIALS - 18EE642																
Course Outcomes:	CO1:	Explain electrical and electronics materials, their importance, classification and operational requirement														
	CO2:	Explain conducting materials,dielectric materials,insulating materials,magnetic materials used in engineering, their properties and classification.														
	CO3:	Explain the phenomenon superconductivity, super conducting materials and their application in engineering.														
	CO4:	Explain the plastic and its properties and applications.														
	CO5:	Explain materials used for Opto electronic devices.														
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	2	3	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	2	3	-	-

SUBJECT: COMPUTER AIDED ELECTRICAL DRAWING - 18EE643																
Course Outcomes:	CO1:	Develop the 2D model of different types of DC and AC machine windings using Electrical CAD software.														
	CO2:	Draw the components of substation like CT, PT, SA, CB, Isolator using Electrical CAD software.														
	CO3:	Develop the 2D Model of various parts and different views of transformer using Electrical CAD software.														
	CO4:	Develop the 2D Model of various parts and different views of DC & AC machine using Electrical CAD software.														
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	-	-	-	3	-	-	-	-	-	-	2	3	3	-
CO2	2	3	2	-	3	-	-	-	-	-	-	-	2	2	3	-
CO3	2	3	2	-	3	-	-	-	-	-	-	-	2	2	3	-
CO4	3	3	2	-	3	-	-	-	-	-	-	-	2	3	3	-

SUBJECT: EMBEDDED SYSTEMS - 18EE644																
Course Outcomes:	CO1:	Explain the Embedded system components														
	CO2:	Apply technological aspects to various interfacing with devices.														
	CO3:	Elaborate various design tradeoffs.														
	CO4:	Apply software aspects and programming concepts to the design of Embedded System.														
	CO5:	Explain how to interface subsystems with external systems.														
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	2	2	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	2	2	-

SUBJECT: OBJECT ORIENTED PROGRAMMING USING C++ - 18EE645															
Course Outcomes:	CO1:	Explain the basics of Object Oriented Programming concepts.													
	CO2:	Apply the object initialization and destroy concept using constructors and destructors.													
	CO3:	Apply the concept of polymorphism to implement compile time polymorphism in programs by using overloading methods and operators.													
	CO4:	Utilize the concept of inheritance to reduce the length of code and evaluate the usefulness.													
	CO5:	Apply the concept of run time polymorphism by using virtual functions, overriding functions and abstract class in programs.													
	CO6	Utilize I/O operations and file streams in programs.													
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO2	3	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO3	3	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO5	3	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO6	3	-	-	-	3	-	-	-	-	-	-	-	-	3	-

SUBJECT: INDUSTRIAL SERVO CONTROL SYSTEMS - 18EE651															
Course Outcomes:	CO1:	Explain the evolution and classification of servos, with descriptions of servo drive actuators, amplifiers, feedback transducers, performance, and troubleshooting techniques.													
	CO2:	Explain system analogs and vectors and the concept of transfer functions for the representation of differential equations													
	CO3:	Explain mathematical equations for electric servo motors, both DC and brushless DC servo motors.													
	CO4:	Represent servo drive components by their transfer function, to combine the servo drive building blocks into system block diagrams.													
	CO5:	Determine the frequency response techniques for proper servo compensation.													
	CO6	Explain perform indices and performance criteria for servo systems and the mechanical considerations of servo systems.													
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO6	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-

SUBJECT: PLC AND SCADA - 18EE652															
Course Outcomes:	CO1:	Discuss history of PLC and describe the hardware components of PLC													
	CO2:	Describe field devices Relays, Contactors, Motor Starters, Switches, Sensors, Output Control Devices, Seal-In Circuits, and Latching Relays commonly used with I/O module													
	CO3:	Analyze PLC timer and counter ladder logic programs and describe the operation of different program control instruction.													
	CO4:	Discuss the execution of data transfer instructions, data compare instructions and the basic operation of PLC closed-loop control system.													
	CO5:	Describe the operation of mechanical sequencers, bit and word shift registers, processes and structure of control systems and communication between the processes.													
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	2	-	-

CO3	3	2	-	-	2	-	-	-	-	-	-	2	2	-	-
CO4	3	-	-	-	2	-	-	-	-	-	-	2	2	-	-
CO5	3	-	-	-	2	-	-	-	-	-	-	3	2	-	-

SUBJECT: RENEWABLE ENERGY RESOURCES - 18EE653																
Course Outcomes:	CO1: Explain causes of energy scarcity and its solution, sun-earth geometry and solar thermal applications. CO2: Explain the types, configurations of solar collectors, performance of solar cell and their applications. CO3: Explain the generation of energy from hydrogen, wind, geothermal system, solid waste and agriculture refuse CO4: Explain the generation of energy from biomass, biogas and tidal energy. CO5: Discuss power generation from sea wave energy and ocean thermal energy															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	-	-	-	-	-	2	-	-	-	-	2	2	-	-
	CO2	3	-	-	-	-	-	2	-	-	-	-	2	2	-	2
	CO3	3	-	-	-	-	2	2	-	-	-	-	2	2	-	2
	CO4	3	-	-	-	-	2	2	-	-	-	-	2	2	-	2
	CO5	3	-	-	-	-	-	2	-	-	-	-	-	2	-	-

SUBJECT: TESTING AND COMMISSIONING OF POWER SYSTEM APPARATUS - 18EE654																
Course Outcomes:	CO1: Explain the Installation of transformers and different tools used for installation process. CO2: Discuss the Installation of Synchronous Machines and their tests. CO3: Explain the installation and Commissioning test of Induction motor. CO4: Explain the Handling, Testing and installation of underground cables and its fault clearance. CO5: Discuss the protection of electrical equipment , its maintenance and domestic testing methods and rules.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	-	-	-	-	2	-	-	-	-	-	2	2	-	-
	CO2	3	-	-	-	-	2	-	-	-	-	-	2	2	-	-
	CO3	2	-	-	-	-	2	-	-	-	-	-	2	2	-	-
	CO4	2	-	-	-	-	2	-	-	-	-	-	2	2	-	2
	CO5	2	-	-	-	-	2	-	-	-	-	-	2	2	-	-

SUBJECT: CONTROL SYSTEM LABORATORY - 18EEL66																
Course Outcomes:	CO1: Determine the time and frequency domain responses of a given second order system using software package and discrete components. CO2: Design and analyse Lead, Lag and Lag-Lead compensators for given specifications. CO3: Determine the performance characteristics of AC and DC servomotors and synchro-transmitter receiver pair used in control systems. CO4: Demonstrate a study on the effect of P, PI, PD and PID controllers for the step response of the system by simulating the second order system. CO5: Construct a script file to draw root locus plot, bode plot and Nyquist plots to study the stability of the system using a software package.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	2	-	-	3	-	-	-	3	2	-	-	3	3	-
	CO2	3	3	3	-	-	-	-	-	3	2	-	-	3	-	-
	CO3	3	2	-	-	-	-	-	-	3	2	-	-	3	-	-
	CO4	3	2	-	-	3	-	-	-	3	2	-	-	3	3	-
	CO5	3	3	3	-	3	-	-	-	3	2	-	-	2	3	3

SUBJECT: DIGITAL SIGNAL PROCESSING LABORATORY - 18EEL67																
Course Outcomes:	CO1: Verify the sampling theorem in time and frequency domain using software package. CO2: Evaluate the solution of impulse response, step response, steady response, steady state response and arbitrary i/p of a given difference equation using software package. CO3: Evaluate the responses of a system using convolution of a given sequence using software package. CO4: Build DFT &IDFT of a given sequence using basic definition and Fast method using software package. CO5: Design and implementation of IIR & FIR filters using software package.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	2	3	-	-	3	-	-	-	2	2	-	-	-	-	
	CO2	2	3	2	-	2	-	-	-	2	2	-	-	-	2	
	CO3	2	3	-	-	3	-	-	-	2	2	-	-	-	3	
	CO4	2	3	2	-	3	-	-	-	2	2	-	-	-	3	
	CO5	2	3	2	-	3	-	-	-	2	2	-	2	-	3	

SUBJECT: Mini-project - 18EEMP68																
Course Outcomes:	CO1: Demonstrate the design and solution of the selected mini-project. CO2: Build the critical thinking and use problem solving skills in societal and environmental contexts. CO3: Develop on their own, reflect on their learning and take appropriate actions to improve it. CO4: Develop team work for conducting the mini-project and Communicate effectively through reports & presentations.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	-	-	3	-	-	-	-	-	-	-	-	-	3	2	-
	CO2	-	-	-	-	-	2	3	-	-	-	-	-	-	-	3
	CO3	-	-	-	2	-	-	-	-	-	-	-	2	-	-	-
	CO4	-	-	-	-	-	-	-	-	3	3	2	-	-	-	-

SUBJECT: POWER SYSTEM ANALYSIS-2 -18EE71															
Course Outcomes:	CO1: Develop network matrices and models for solving load flow problems.														
	CO2: Evaluate the steady state power flow analysis of power systems using numerical iterative techniques.														
	CO3: Determine optimum generation scheduling and optimal unit commitment of thermal power plants.														
	CO4: Analyse short circuit faults in power system networks using bus impedance matrix.														
	CO5: Determine numerical solution of swing equation for multi-machine stability.														
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	2	3	-	2
CO4	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-

SUBJECT: POWER SYSTEM PROTECTION - 18EE72	
Course Outcomes:	<p>CO1: Classify various protective relays based on their construction and operating principles.</p> <p>CO2: Compare the characteristics of various schemes and forms of overcurrent protection.</p> <p>CO3: Explain the working of various distance relays and the effects of arc resistance, power swings, line length and source impedance on their performance.</p> <p>CO4: Explain the performance of differential relays, protection of power system components and various pilot protection schemes.</p> <p>CO5: Discuss the principle of current interruption in different types of circuit breakers.</p> <p>CO6: Explain the construction and operating principle of different types of fuses, protection against overvoltage and Gas Insulated Substation (GIS).</p>

Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	2	-	-	-	2	-	-	-	-	-	-	2	-	-
CO3	3	-	-	-	-	2	-	-	-	-	-	-	2	-	-
CO4	3	-	-	-	-	2	-	-	-	-	-	-	2	-	-
CO5	2	2	-	-	-	2	2	-	-	-	-	-	2	2	-
CO6	2	-	-	-	-	2	2	-	-	-	-	-	2	2	-

SUBJECT: SOLAR AND WIND ENERGY - 18EE731

Course Outcomes:	CO1:	Discuss the importance of energy in human life, relationship among economy and environment with energy use and the increasing role of renewable energy.														
	CO2:	Explain the concept of energy storage, the principles of energy storage devices and solar radiation on horizontal and tilted surface, its characteristics, measurement and analysis of radiation data.														
	CO3:	Describe the process of harnessing solar energy and its applications in heating and cooling.														
	CO4:	Discuss fabrication, operation of solar cell, electrical characteristics, sizing and design of solar PV systems and their applications.														
	CO5:	Explain basic Principles of Wind Energy Conversion, collection of wind data, energy estimation and site selection.														
	CO6:	Discuss the performance of Wind-machines, energy storage, applications of Wind Energy and environmental aspects.														
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	2	-	-	-	-	2	3	-	-	-	-	-	2	-	2
	CO2	3	-	-	-	-	2	2	-	-	-	-	-	2	-	2
	CO3	3	-	-	-	-	3	3	-	-	-	-	-	2	-	2
	CO4	3	-	-	-	-	3	3	-	-	-	-	-	2	2	-
	CO5	3	-	-	-	-	3	3	-	-	-	-	-	2	-	2
	CO6	3	-	-	-	-	2	3	-	-	-	-	-	2	2	-

SUBJECT: SENSORS AND TRANSDUCERS - 18EE732

Course Outcomes:	CO1:	Explain need of transducers and sensors, their classification, advantages and disadvantages and their working.														
	CO2:	Discuss the recent trends in sensor technologies and their selection.														
	CO3:	Explain the basics of signal conditioning, signal conditioning equipment, configuration of Data Acquisition System and data conversion														
	CO4:	Describe data transmission and telemetry														
	CO5:	Explain the measurement of non-electrical quantities- Pressure,temperature, flow, speed, force, torque, power and viscosity														
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO2	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO4	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO5	3	-	-	-	-	-	-	-	-	-	-	-	2	2	-

SUBJECT: INTEGRATION OF DISTRIBUTED GENERATION - 18EE733

Course Outcomes:	CO1:	explain power generation by alternate energy source like wind power and solar power													
	CO2:	Discuss the integration of distributed generation and its effect on the performance of the power system.													
	CO3:	Examine the impact of integration of distributed generation on Voltage Magnitude Variations.													
	CO4:	explain the impact of integration of distributed generation on Power Quality Disturbances.													
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	3	-	-	-	-	2	-	-	2
CO2	3	3	-	3	-	-	3	-	-	-	-	2	3	-	2
CO3	3	3	2	3	3	-	-	-	-	-	-	3	3	-	2
CO4	3	3	2	3	3	-	-	-	-	-	-	3	3	-	2

SUBJECT: ADVANCED CONTROL SYSTEMS - 18EE734

Course Outcomes:	CO1:	Discuss state variable approach for linear time invariant systems in both the continuous and discrete time systems.														
	CO2:	Develop of state models for linear continuous – time and discrete – time systems.														
	CO3:	Apply vector and matrix algebra to find the solution of state equations for linear continuous – time and discrete – time systems.														
	CO4:	Define controllability and observability of a system and test for controllability and observability of a given system.														
	CO5:	Design pole assignment and state observer using state feedback.														
	CO6:	Develop the describing function for the nonlinearity present to assess the stability of the system and Lyapunov function for the stability analysis of nonlinear systems.														
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
	CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
	CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
	CO4	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
	CO5	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
	CO6	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-

SUBJECT: REACTIVE POWER CONTROL IN ELECTRIC POWER SYSTEMS - 18EE735

Course Outcomes:	CO1:	Distinguish the importance of load compensation in symmetrical as well as unsymmetrical loads.														
	CO2:	Explain various compensation methods in transmission lines.														
	CO3:	Distinguish demand side reactive power management & user side reactive power management.														
	CO4:	Construct model for reactive power coordination and effects of harmonics on electrical equipments.														
	CO5:	Discuss the Reactive Power Planning for the electricity boards.														
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO2	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO3	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
	CO4	2	2	-	-	-	-	-	-	-	-	-	-	2	2	-
	CO5	2	2	-	-	-	-	-	-	-	-	-	-	2	2	-

SUBJECT: INDUSTRIAL DRIVES AND APPLICATIONS - 18EE741

Course Outcomes:	CO1:	Explain choice of electric drives,its parts and advantages														
	CO2:	Discuss dynamics and modes of operation of electric drives.														
	CO3:	Explain the selection of power rating of motor and control of dc motor using rectifiers.														
	CO4:	Analyze the performance of induction motor drives under different conditions														
	CO5:	Analyse the control of induction motor, synchronous motor and stepper motor drives														
	CO6:	Discuss typical applications of electrical drives in the industry .														
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
	CO1	2	-	-	-	-	-	-	-	-	-	-	2	3	-	2
	CO2	2	3	-	-	-	-	-	-	-	-	-	2	3	-	2
	CO3	2	3	-	-	-	-	-	-	-	-	-	2	2	-	2
	CO4	2	3	-	-	-	-	-	-	-	-	-	2	2	-	2

CO5	2	2	-	-	-	-	-	-	-	-	-	-	-	2	3	-	2
CO6	2	2	-	-	-	-	-	-	-	-	-	-	2	2	-	2	

SUBJECT: UTILIZATION OF ELECTRICAL POWER - 18EE742															
Course Outcomes:	CO1: Analyze heating , welding scheme and Electrolytic process														
	CO2: Design illumination scheme for various application .														
	CO3: Explain the different traction system and speed control for the traction systems.														
	CO4: Explain the various braking operation for different types of drives ,Tramways and Trolley.														
	CO5: Analyze about the Performance, concept and architecture of different Electric Vehicles.														
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	2	3	3	-	-	-	-	-	-	-	-	3	3	-	3
CO3	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	3	3	-	3

SUBJECT: PLC and SCADA - 18EE743															
Course Outcomes:	CO1: Describe the hardware components of PLC: I/O modules, CPU, memory devices, other support devices, operating modes and PLC programming.														
	CO2: Describe field devices Relays, Contactors, Motor Starters, Switches, Sensors, Output Control Devices, Seal-In Circuits, and Latching Relays commonly used with I/O module.														
	CO3: Convert relay schematics and narrative descriptions into PLC ladder logic programs.														
	CO4: Analyse PLC timer and counter ladder logic programs.														
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	2	-	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	2	2	-
CO4	3	-	-	-	2	-	-	-	-	-	-	-	2	2	-

SUBJECT: SMART GRID - 18EE744																
Course Outcomes:	CO1: Explain the architecture, measurement techniques and tools for the analysis of smart grid. CO2: Discuss classical optimization techniques and computational methods for smart grid design, planning and operation. CO3: Explain predictive grid management and control technology for enhancing the smart grid performance CO4: Develop cleaner, more environmentally responsible technologies for the electric system. CO5: Discuss the computational techniques, communication, measurement, and monitoring technology tools essential to the design of the smart grid.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	3	-	-	-	-	-	-	-	-	-	2	-	-	
	CO2	3	3	-	-	-	-	-	-	-	-	3	-	2	-	-
	CO3	3	2	-	-	-	-	-	-	-	-	-	2	-	-	
	CO4	2	-	-	-	-	-	3	-	-	-	-	-	2	-	-
	CO5	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-

SUBJECT: ARTIFICIAL NEURAL NETWORK WITH APPLICATIONS TO POWER SYSTEMS - 18EE745	
Course Outcomes:	CO1: Develop Neural Network and apply elementary information processing tasks that neural network can solve. CO2: Develop Neural Network and apply powerful, useful learning techniques. CO3: Develop and Analyze multilayer feed forward network for mapping provided through the first network layer and error back propagation algorithm.

	CO4:	Analyze and apply algorithmic type problems to tackle problems for which algorithms are not available.													
	CO5:	Develop and Analyze supervised/unsupervised, learning modes of Neural Network for different applications.													
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	3	-	-	-	-	-	-	-	-	-	-

SUBJECT: INDUSTRIAL MOTORS & CONTROL - 18EE751

Course Outcomes:	CO1:	explain the procedure of selecting rating of the motor for any application.														
	CO2:	Classify DC motors, explain the torque speed characteristics and select a motor for an application.														
	CO3:	Explain the types of Starting and Breaking of Motors														
	CO4:	Explain the different types of Speed Control of Motors														
	CO5:	Selection of Motors for Industrial Drives & Economic Selection of Electric Motors.														
	CO6:	Discuss Electrical Drawings, Installation, Maintenance & Safety														
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO5	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO6	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SUBJECT: SENSORS AND TRANSDUCERS - 18EE752

Course Outcomes:	CO1:	Explain need of transducers and sensors, their classification, advantages and disadvantages and their working.														
	CO2:	Discuss the recent trends in sensor technologies and their selection.														
	CO3:	Explain the basics of signal conditioning, signal conditioning equipment, configuration of Data Acquisition System and data conversion														
	CO4:	Describe data transmission and telemetry														
	CO5:	Explain the measurement of non-electrical quantities- Pressure,temperature, flow, speed, force, torque, power and viscosity														
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	-	-	-	-	-	-	-	-	-	-	2	-	-	
	CO2	2	-	-	-	-	-	-	-	-	-	-	2	-	-	
	CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	
	CO4	2	-	-	-	-	-	-	-	-	-	-	2	-	-	
	CO5	3	-	-	-	-	-	-	-	-	-	-	2	2	-	

SUBJECT: ELECTRIC VEHICLES - 18EE753

Course Outcomes:	CO1:	Explain the roadway fundamentals, laws of motion, vehicle mechanics and propulsion system design.													
	CO2:	Explain the working of electric vehicles and hybrid electric vehicles in recent trends.													
	CO3:	Model batteries, Fuel cells, PEMFC and super capacitors.													
	CO4:	Analyze DC and AC drive topologies used for electric vehicle application.													
	CO5:	Develop the electric propulsion unit and its control for application of electric vehicles.													
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	2	-	-	-	2
CO3	3	2	2	-	-	-	-	-	-	-	2	-	-	-	2
CO4	3	2	-	-	-	-	-	-	-	-	2	-	-	-	2
CO5	3	-	2	-	-	-	-	-	-	-	2	-	-	-	2

SUBJECT: ELECTRICAL ENERGY CONSERVATION AND AUDITING - 18EE754

Course Outcomes:	CO1: Analyze about energy scenario nationwide and worldwide CO2: Discuss load management techniques and energy efficiency. CO3: Explain the need of energy audit and energy audit methodology. CO4: Explain various pillars of electricity market design. CO5: Conduct energy audit of electrical systems and buildings.														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	-	2	-	-	-	-	-	-	-	-	-	-	-	-
	CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO4	3	-	-	-	-	-	-	-	-	-	-	-	-	-
	CO5	-	-	-	3	-	-	-	-	-	-	3	-	-	2

SUBJECT: POWER SYSTEM SIMULATION LABORATORY - 18EEL76

Course Outcomes:	CO1: Develop a program in MATLAB to assess the performance of medium transmission lines. CO2: Build a program in MATLAB to obtain the power-angle curve of salient and non-salient pole synchronous machines. CO3: Develop a program in MATLAB to assess transient stability through swing curve. CO4: Build programs in MATLAB to formulate bus admittance and bus impedance matrices and analyse short circuit faults using Mi-Power software package. CO5: Solve power flow problem for a simple power system using Mi-Power software package. CO6: Solve optimal generation scheduling problems for thermal power plants using Mi-Power software package.														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	-	3	-	-	3	-	-	3	2	-	-	3	3	-
	CO2	-	3	-	-	3	-	-	3	2	-	-	3	3	-
	CO3	-	3	-	-	3	-	-	3	2	-	-	3	3	-
	CO4	-	3	-	2	3	-	-	3	2	-	2	3	3	2
	CO5	-	3	-	2	3	-	-	3	2	-	2	3	3	2
	CO6	-	3	3	-	3	-	-	3	2	-	2	3	3	2

SUBJECT: RELAY AND HIGH VOLTAGE LABORATORY - 18EEL77

Course Outcomes:	CO1: Determine the characteristics of electromagnetic relays CO2: Determine the characteristics of microprocessor based relays CO3: Analyze the spark over characteristics for both uniform and non-uniform configurations using High AC and DC voltages. CO4: Measure high AC and DC voltages and breakdown strength of transformer oil. CO5: Determine the electric field and measure the capacitance of different electrode configuration models														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	-	-	-	2	-	-	-	2	2	-	2	3	-	-
	CO2	-	-	-	3	-	-	-	2	2	-	2	3	-	-
	CO3	-	-	-	2	-	-	-	2	2	-	2	3	-	-

CO4	-	-	-	2	-	-	-	-	2	2	-	2	3	-	-
CO5	-	-	-	2	-	-	-	-	2	2	-	2	3	-	-

SUBJECT: PROJECT PHASE – I - 18EEP78																
Course Outcomes:	CO1: Identify and formulate the engineering problems for the need of society. CO2: Demonstrate a sound technical knowledge of their selected project topic CO3: Design solutions for engineering problems using modern tool/technology to investigate with interpretation of data. CO4: Discuss the impact of the engineering solutions in societal and environmental contexts for sustainable development with commit to professional ethics. CO5: Develop team work for conducting the project and Communicate effectively through reports & presentations. CO6: Adapt engineering, management and ethical principles for Project management and finance.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	3	-	-	-	3	-	-	-	-	-	2	3	3	
	CO2	-	-	3	3	3	-	-	-	-	-	-	3	3	3	
	CO3	-	-	-	-	-	3	3	3	-	-	-	3	3	3	
	CO4	-	-	-	-	-	-	-	3	3	-	3	3	3	3	
	CO5	-	-	2	-	-	-	-	3	-	-	3	3	3	3	
	CO6	-	-	2	-	-	-	-	3	-	-	3	3	3	3	

SUBJECT: POWER SYSTEM OPERATION AND CONTROL-18EE81																
Course Outcomes:	CO1: Describe various levels of controls in power systems, components, architecture and configuration of SCADA. CO2: Build mathematical models of ALFC by identifying the basic control loops in generator and functions of AGC in an isolated and interconnected systems. CO3: Apply the voltage and reactive power controls in power system. CO4: Explain reliability, security, contingency analysis, state estimation and its issues in power systems.															
	Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	2	-	-	-	-	-	-	-	-	-	-	2	2	-	2
	CO2	3	3	2	-	-	-	-	-	-	-	-	2	3	-	2
	CO3	2	2	-	-	-	-	-	-	-	-	-	2	2	-	2
	CO4	2	2	-	2	-	-	-	-	-	-	-	-	2	-	-

SUBJECT: FACTS AND HVDC TRANSMISSION - 18EE821	
Course Outcomes:	<p>CO1: Discuss transmission interconnections, flow of Power in an AC System, limits of the loading capability,dynamic stability considerations of a transmission interconnection and controllable parameters.</p> <p>CO2: Explain the basic concepts, definitions of flexible ac transmission systems and benefits from FACTS technology.</p> <p>CO3: Describe shunt controllers, Static Var Compensator and Static Compensator for injecting reactive power in the transmission system in enhancing the controllability and power transfer capability.</p> <p>CO4: Describe series Controllers Thyristor-Controlled Series Capacitor (TCSC) and the Static Synchronous Series Compensator (SSSC) for control of the transmission line current.</p> <p>CO5: Explain advantages of HVDC power transmission, overview and organization of HVDC system and converter control for HVDC systems, commutation failure, control functions.</p> <p>CO6: Describe the basic components of a converter, the methods for compensating the reactive power demanded by the converter.</p>

Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO6	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-

SUBJECT: ELECTRICAL ESTIMATION AND COSTING - 18EE822															
Course Outcomes:	CO1: Explain the principles of estimation and Indian electricity rules.														
	CO2: Estimate internal wiring installation using the concepts of cable types and specifications.														
	CO3: Estimate service connections and motor wiring installations.														
	CO4: Estimate overhead transmission and distribution lines.														
	CO5: Estimate substation using the substation components.														
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	2	-	-	-	-	-	-	-	2	2	2	-	2
CO3	3	2	-	-	-	-	-	-	-	-	2	-	2	-	2
CO4	3	2	-	-	-	-	-	-	-	-	2	-	2	-	2
CO5	3	2	-	-	-	-	-	-	-	-	2	-	2	-	-

SUBJECT: POWER SYSTEM PLANNING - 18EE824															
Course Outcomes:	CO1: Explain the basic concept and structure of power system planning.														
	CO2: Analyse the different strategy of generation planning to improve national grid.														
	CO3: Analyse different designing of optimum power system expansion with computer aided planning.														
	CO4: Explain the process to improve reliability of power system and reactive power compensation.														
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	3	-	-	-	3	-	3	-	-
CO2	3	2	-	-	-	-	-	-	-	-	3	-	2	-	-
CO3	3	3	-	-	-	-	-	-	-	-	2	3	1	-	-
CO4	3	-	-	2	-	-	-	-	-	-	-	1	3	-	-

SUBJECT: ELECTRICAL POWER QUALITY - 18EE825

	CO3: Identify various sources of harmonics, explain effects of harmonic distortion. CO4: Evaluate harmonic distortion, control harmonic distortion. CO5: Estimate power quality in distribution planning. Identify power quality issues in utility system.														
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	2	-	-	-	-	-	-	-	2	-	-	2
CO2	-	3	-	-	-	-	-	-	-	-	-	2	-	-	2
CO3	2	2	-	-	-	-	-	-	-	-	-	2	-	-	2
CO4	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-

SUBJECT: PROJECT WORK PHASE-II - 18EEP83															
Course Outcomes:	CO1: Demonstrate the design and solution of the selected project. CO2: Build the critical thinking and use problem solving skills CO3: Discuss the impact of the engineering solutions in societal and environmental contexts for sustainable development with commit to professional ethics. CO4: Develop on their own, reflect on their learning and take appropriate actions to improve it. CO5: Develop team work for conducting the project and Communicate effectively through reports & presentations. CO6: Adapt engineering, management and ethical principles for Project management and finance.														
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	3	-	-	-	-	-	2	3	-	-
CO2	-	-	3	3	3	-	-	-	-	-	-	3	3	-	-
CO3	-	-	3	-	-	3	3	3	-	-	-	3	-	-	3
CO4	-	-	3	-	-	-	-	-	3	3	-	3	-	3	-
CO5	-	-	3	-	-	-	-	3	-	-	3	3	3	-	3
CO6	-	-	3	-	-	-	-	3	-	-	3	3	3	-	3

SUBJECT: TECHNICAL SEMINAR - 18EES84															
Course Outcomes:	CO1: Develop knowledge in the field of electrical and electronics engineering and other disciplines through independent learning and collaborative study. CO2: Identify and discuss current, real-time issues CO3: Develop oral and written communication skills CO4: Build an appreciation of the self in relation to its larger diverse social and academic contexts CO5: Apply principles of ethics and respect in interaction with others.														
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	3	2	3	-	-	-	3	-	-	3	2	-
CO2	-	-	-	3	-	-	3	-	-	-	-	2	-	2	-
CO3	-	-	-	-	-	-	-	-	-	3	-	3	-	-	-
CO4	-	-	-	-	-	3	3	-	-	-	-	3	-	-	-
CO5	-	-	-	-	-	-	-	3	-	3	-	3	-	-	-

SUBJECT: INTERNSHIP - 18EEI85															
Course Outcomes:	CO1: Adapt the practical experience within industry in which the internship is done. CO2: Apply knowledge and skills learned to classroom work and project. CO3: Develop a greater understanding about career options. CO4: Develop and refine the oral and written communication skills. CO5: Adapt the knowledge of administration, marketing, finance and economics.														
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CO1	-	-	-	2	-	-	-	-	2	-	-	2	3	3	3
CO2	-	-	-	2	-	-	-	-	3	2	3	2	3	2	3
CO3	-	-	-	-	-	-	-	2	3	-	-	-	3	2	3
CO4	-	-	-	-	-	-	-	-	3	3	-	-	3	2	3
CO5	-	-	-	-	-	-	-	2	3	2	3	2	3	3	3