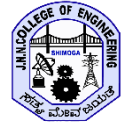**National Education Society (R.)**

Jawaharlal Nehru New College of Engineering, Shivamogga

(Approved by AICTE, New Delhi, Certified by UGC 2f & 12B, Accredited by NAAC –'B', UG programs:CE,ME,EEE,ECE,CSE,ISE, ETE PG Programs: MBA, acredited by NBA:1.7.2022 to 30.6.2025, Recognized by Govt. of Karnataka and Affiliated to VTU, Belagavi)

INTERNAL QUALITY ASSURANCE CELL (IQAC)

2018 Scheme

Sl.No	Branch	Sem	Subject	CO,S
1	EEE	3	Transform Calculus, Fourier Series and Numerical Techniques Mathematics (18MAT31)	1. To remember the definition of Laplace transform, Fourier series, Fourier transform, Z-transform formulae of numerical methods and calculus of variations.
				2. To understand the concept of periodic function, unit step function, convolution theorem in Laplace transform Fourier series of period 2 pi, arbitrary period 2l, Half range series, Z-transform, numerical methods and calculus of variations.
				3. To apply the concept of Laplace transform in second and higher order linear differential equations Harmonic analysis in Fourier series, Z-transform in difference equations, Numerical solution of ODE's by various methods and Euler's equation, Geodesics, in calculus of variations.
2		3	Electric Circuit Analysis (18EE32)	1. Understand the basic concepts, application of source shifting, transformation techniques for reducing the network to simple forms, evaluation of equivalent resistance using star-delta transformation and steady state solution of DC & AC networks by mesh and nodal analysis

				2. Solve complex electric circuits energized by independent and dependent sources by applying network theorems and deducing the condition for maximum power transfer to the connected load
				3. Discuss resonance in series and parallel circuits and evaluation of initial conditions in simple electrical circuits arising out of opening and closing of switches
				4. Synthesize of standard input waveforms and its frequency domain representation using Laplace transform techniques and evaluation of initial and final values of Laplace transformed functions using theorems
				5. Solve unbalanced three phase systems to calculate real and reactive power delivered to different loads connected and expressing a two port network in terms of its characteristic parameters
3		3	Transformers and Generators (18EE33)	1. Understand the construction and operation of single phase, 3phase and autotransformers.
				2. Analyze the performance of single phase and 3 phase transformers by different tests.
				3. Understand the construction and operation of DC Generators and AC Generators
				4. Analyse the operation of AC generators on infinite bus and efficiency and regulation by direct loading
				5. Apply Different Methods to Determine the Regulation Of an Alternator
4		3	Analog Electronic Circuits (18EE34)	1. Discuss the output response of clipper, clamper circuits & biasing circuits for transistor amplifiers.

				2. Analyse h-parameter of BJT transistor in Common Emitter, Common Collector and Common Base configuration.
				3. Discuss the concept & different types of multi stage and feedback amplifiers.
				4. Analyze the power amplifier circuits and oscillators for different frequencies.
				5. Illustrate FET and MOSFET amplifiers in the common source mode with fixed bias.
5		3	Digital System Design (18EE35)	1. Understand the switching equations generated from truth table and simplification of K-maps.
				2. Design of combinational logic circuits Adders, Subtractor, Comparators, Decoders, Encoders and Multiplexers
				3. Analyze latches, Flipflops and Registers.
				4. Design of Synchronous Counters.
				5. Design Mealy and Moore Synchronous sequential circuits models and construct state diagrams for sequential circuits.
6		3	Electrical and Electronic Measurements (18EE36)	1. Understand the dimensional equation of Electrical parameters and using bridges to measure resistance, inductance and capacitance.
				2. Explain the working of various meters used for measurement of Power, Energy & understand theadjustments, calibration & errors in energy meters.
				3. Understand methods of extending the range of instruments & instrument transformers.
				4. Explain the working of different electronic and digital instruments.
				5. Explain the working of different display and recording devices.

7		3	Constitution of India, Professional Ethics and Cyber Law (18CPC39)	1. Have constitutional knowledge and legal literacy.
				2. Understand Engineering and Professional ethics and responsibilities of Engineers.
				3. Understand the the cybercrimes and cyber laws for cyber safety measures.
8		3	Electrical Machines Laboratory -1 (18EEL37)	1. evaluate the performance of the transformers from the test data obtained
				2. Connect and operate two single phase transformers of different KVA rating in parallel.
				3. Connect single phase transformers for three phase operation and phase conversion.
				4. Assess the performance of synchronous generator connected to infinite bus and determine the voltage regulation by using EMF,MMF and ZPF methods
9		3	Electronics Laboratory (18EEL38)	1. Design rectifier circuits with and without capacitor filters.
				2. Determine h-parameter models of transistor for all modes.
				3. Design BJT and FET amplifier and oscillator circuits.
				4. Realize Boolean expressions, adders, Subtractors and counters using gates.
10		4	Complex Analysis, Probability And Statistical Methods (18MAT41)	1. Remember the concept of probability to solve the problems on probability distribution and joint probability distribution.
				2. Understand the concept of correlation, regression and curve fitting.
				3. Demonstrate testing of hypothesis of sampling distribution.
				4. Apply the knowledge of complex differentiation and complex integration in

				diverse fields related to field theory and signal processing.
11		4	Additional Mathematics - 2 (18MATDIP41)	1. Solve rank of matrix by elementary row operations - Echelon form. Consistency of system of linear equations - Gauss elimination method
				2. Demonstrate various physical models through 2 nd and higher order linear differential equation and solve such equations.
				3. Construct a variety of Partial differential equation and solution by direct integration , method of separation of variables
				4. Apply the knowledge of numerical methods, infinite series and series solution of ordinary differential equation to explain various physical and engineering problems.
12		4	Power Generation and Economics (18EE42)	1. Understand the concepts of hydroelectric, steam, diesel, gas turbine and nuclear power plants, substation and functions of necessary equipment for day to day operations
				2. Merits and demerits of each type of power plant and assess the impact of the different power plants on the environment and some remedial measures
				3. Layout of substation, understand the safety measures to be taken in substation, grounding practices and its effects on system operation
				4. Apply the economic aspects of power plant operations, type of tariff for consumers and importance of power factor improvement from different perspectives
13		4	Transmission and Distribution (18EE43)	1. Discuss the overhead transmission lines and overhead line insulator.

				2. Analyze the transmission line parameters.
				3. Design and analyze performance of transmission line.
				4. Explain the use of underground cables and corona in transmission.
				5. Evaluate different types of distribution systems.
14		4	Electric Motors (18EE44)	1. Explain the construction, operation and classification of DC Motor, AC motor and Special purpose motors.
				2. Describe the performance characteristics & applications of Electric motors
				3. Demonstrate and explain the methods of testing of DC machines and determine losses and efficiency
				4. Control the speed of DC motor and induction motor.
				5. Explain the starting methods, equivalent circuit and phasor diagrams, torque angle, effect of change in excitation and change in load, hunting and damping of synchronous motors.
15		4	Electromagnetic Field Theory (18EE45)	1. Use different coordinate systems to explain the concept of gradient, divergence and curl of a vector.
				2. Use Coulomb's Law and Gauss Law for the evaluation of electric fields produced by different charge configurations.
				3. Calculate the energy and potential due to system of charges and capacitances with the knowledge different boundary conditions
				4. Explain the behavior of magnetic fields and magnetic materials.
				5. Assess time varying fields and propagation of waves in different media.

16		4	Operational Amplifiers and Linear ICs (18EE46)	1. Describe the characteristics of ideal and practical operational amplifier.
				2. Design filters and signal generators using linear ICs and learn the basics of voltage regulators.
				3. Demonstrate the application of linear ICs as comparators, converters.
				4. Analysis of the signal processing circuits, A/D and D/A converters.
				5. Explain the basics of PLL and Timer circuits and use of ICs in electronic projects.
17		4	Electrical Machines Laboratory -2 (18EEL47)	1. Test DC machines to determine their characteristics and also to control the speed of DC motor
				2. Pre-determine the performance characteristics of DC machines by conducting suitable tests.
				3. Perform load test on single phase and three phase induction motor to assess its performance.
				4. Conduct test on induction motor to pre-determine the performance characteristics.
				5. Conduct test on synchronous motor to draw the performance curves.
18		4	Op- amp and Linear ICs Laboratory (18EEL48)	1. To conduct experiment to determine the characteristic parameters of OP-Amp
				2. To design test the OP-Amp as Amplifier, adder, subtractor, differentiator and integrator.
				3. To design test the OP-Amp as oscillators and filters.
				4. Design and study of Linear IC's as multivibrator power supplies.

19		5	Management and Entrepreneurship (18EE51)	1. Explain the field of management, task of the manager, planning and steps in decision making.
				2. Discuss the structure of organization, importance of staffing, leadership styles, modes of communication, techniques of coordination and importance of managerial control in business.
				3. Explain the concepts of entrepreneurship and a businessman's social responsibilities towards different groups.
				4. Show an understanding of role of SSI's in the development of country and state/central levelinstitutions/agencies supporting business enterprises.
				5. Discuss the concepts of project management, capital budgeting, project feasibility studies, need for project report and new control techniques.
20		5	Microcontroller (18EE52)	1. Explain the 8051 architecture, registers, internal memory organization, addressing modes.
				2. Develop 8051 Assembly level programs using the 8051 instruction set. Accessing data and I/O port programming.
				3. Develop 8051 C programs for time delay, I/O operations, I/O bit manipulation, logic and arithmetic operations, data conversion and timer/counter programming.
				4. Develop 8051 programs for serial data communication and interrupt programming.
				5. Design interfacing circuits with 8051 to communicate with peripherals.
21		5	Power Electronics (18EE53)	1. Explain application area of power electronics, types of power electronic

					circuits and types of power diodes, their effects. Explain the design, operation analysis of single phase diode rectifier circuits.
					2. Explain steady state, switching characteristics and gate control requirements of different power transistors and their limitations.
					3. Discuss different types of Thyristors, their operation, gate characteristics and gate control requirements.
					4. Explain designing, analysis techniques and characteristics of thyristor controlled rectifiers. Discuss the principle of operation of AC voltage controllers
					5. Explain the principle of operation of single phase and three phase DC-DC and DC-AC converters
22		5		Signals and Systems (18EE54)	1. Classify the signals and systems with basic operations on signals and properties of systems.
					2. Use convolution in both continuous and discrete domain for the analysis of systems, given the impulse response of a system.
					3. Evaluate response of a given linear time invariant system through differential/difference equations and block diagram representation of a linear time invariant system.
					4. Apply continuous time and discrete time Fourier transform representation to study signals and linear time invariant systems.
					5. Use Z-transform and properties of Z transform for the analysis of discrete time systems.

23		5	Electrical Machine Design (18EE55)	1. Understand the design factors, limitations, modern trends in design and properties of materials used in electrical machines
				2. Know the concept of specific loading and to design the DC machines by estimating the main dimensions
				3. Design single phase and three phase transformers by estimating necessary parameters.
				4. Design three phase induction motor by estimating main dimensions of stator and number of stator slots
				5. Design synchronous machines by estimating main dimensions and to discuss the short circuit ratio effect on performance of the machine.
24		5	High Voltage Engineering (18EE56)	1. Explain conduction and breakdown phenomenon in gases, liquid dielectrics and break down phenomenon in solid dielectrics.
				2. Summarize generation of high voltages and currents
				3. Outline measurement techniques for high voltages and currents.
				4. Summarize over voltage phenomenon and insulation coordination in electric power systems.
				5. Explain non-destructive testing of materials and electric apparatus, high-voltage testing of electric apparatus
25		5	Microcontroller Laboratory (18EEL57)	1. Write assembly language programs for data transfer, arithmetic, Boolean and logical instructions and code conversions.
				2. Write ALP using subroutines for generation of delays, counters, configuration

				of SFRs for serial communication and timers.
				3. Interface 8051 microcontroller to peripheral devices through embedded C programs using Keil µVision-3 Embedded Workbench tools.
				4. Work with a small team to carryout experiments using microcontroller concepts and prepare reports that present lab work
26		5	Power Electronics Laboratory (18EEL58)	1. Explain application area of power electronics, types of power electronic circuits.
				2. Design controlled and un controlled rectifiers, analyse the characteristics of switching devices, single-phase controlled rectifier circuits, and analyse the waveforms.
				3. Control the speed of AC/DC motors and stepper motors using AC voltage controller, Controlled rectifier and choppers.
				4. Use different firing circuits for power electronic applications.
				5. Analyse characteristics of SCR, MOSFET, IGBT and TRIAC
27		6	Control Systems (18EE61)	1. Evaluate the transfer function of a LTI system with the effects of feedback for different types of feedback control systems
				2. Apply block diagram manipulation and signal flow graph methods to obtain transfer function of systems.
				3. Determine transient and steady state time response of a simple control system
				4. Evaluate the stability of LTI systems by investigating performance of a given system

				in time and frequency domains using Root locus, Bode plots and Nyquist plots.
				5. Determine the controller or compensator configuration and parameter values relative to how it is connected to the controlled process given the design specifications
28		6	Power System Analysis - 1 (18EE62)	1. Model the power system components & construct per unit impedance diagram of power system
				2. Analyze three phase symmetrical faults on power system.
				3. Compute unbalanced phasors in terms of sequence components and vice versa, also develop sequence networks
				4. Analyze various unsymmetrical faults on power system
				5. Examine dynamics of synchronous machine and determine the power system stability
29		6	Digital Signal Processing (18EE63)	1. Apply DFT and IDFT to perform linear filtering techniques on given sequences to determine the output.
				2. Apply fast and efficient algorithms for computing DFT and inverse DFT of a given sequence.
				3. Design and realize infinite impulse response Butterworth and Chebyshev digital filters using impulse invariant and bilinear transformation techniques.
				4. Develop a digital IIR filter by direct, cascade, parallel, ladder and FIR filter by direct, cascade and linear phase methods of realization.

					5. Design and realize FIR filters by use of window function and frequency sampling method.
30		6	Sensors And Transducers (18EE647)		1. Use gauges and transducers to measure pressure, direction and distance.
					2. Discuss the use of light transducers and other devices used for the measurement of electromagnetic radiations.
					3. Explain the working of different temperature sensing devices.
					4. Discuss the principles and applications of audio electrical sensors and transducers used for the measurement of sound.
					5. Discuss the use of sensors for the measurement of mass, volume and environmental quantities.
31		6	Renewable Energy Resources (18EE653)		1. Discuss causes of energy scarcity and its solution, energy resources and availability of renewable energy.
					2. Outline energy from sun, energy reaching the Earth's surface and solar thermal energy applications, Summarize tidal energy resources, sea wave energy and ocean thermal energy.
					3. Discuss types of solar collectors, their configurations, solar cell system, its characteristics and their applications.
					4. Explain generation of energy from hydrogen, wind, geothermal system, solid waste and agriculture refuse.
					5. Discuss production of energy from biomass, biogas,
32		6	Control System Laboratory (18EEL66)		1. Use software package or discrete components in assessing the time and

				frequency domain responses of a given second order system.	
				2. Design and analyze Lead, Lag and Lag – Lead compensators for given specifications.	
				3. Determine the performance characteristics of ac and dc servomotors and synchro-transmitter receiver pair used in control systems	
				4. 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.	
				5. Write files to plot root locus, bode plot, Nyquist plots to study the stability of the system using a software package.	
33		6	Digital Signal Processing Laboratory (18EEL67)	1. Explain physical interpretation of sampling theorem in time and frequency domains.	
				2. Perform convolution of given sequences to evaluate the response of a system.	
				3. Compute DFT and IDFT of a given sequence using the basic definition and/or fast methods.	
				4. Design and implement IIR and FIR filters.	
34		6	Mini-project (18EEMP68)	1. Consolidate the literature's referred to identify and formulate the engineering problem.	
				2. Arrive at a list of available engineering tools that may be used for solving the identified engineering problem.	
				3. Design the hardware / software related to work undertaken.	
				4. Analyze and interpret results of experiments conducted on the designed	

				solution(s) to arrive at result based conclusion.
				5. Demonstrate professional skill-sets.
35		7	Power System Analysis - 2 (18EE71)	1. Formulate network matrices and models for solving load flow problems
				2. Perform steady state power flow analysis of power systems using numerical iterative techniques
				3. Solve issues of economic load dispatch and unit commitment problems
				4. Analyze short circuit faults in power system networks using bus impedance matrix
				5. Apply Point by Point method and Runge Kutta Method to solve Swing Equation
36		7	Power System Protection (18EE72)	1. Apply the basic knowledge of performance of protective relays, components of protection scheme, relay terminology, relay construction and operating principles.
				2. Study of Overcurrent protection using electromagnetic, static relays and Overcurrent protective schemes.
				3. Discuss types of electromagnetic and static distance relays, effect of arc resistance, power swings, line length and source impedance on performance of distance relays.
				4. Explain pilot protection; wire pilot relaying and carrier pilot relaying and study of construction, operating principles. Performance of various differential relays for differential protection. Study of Protection of generators, motors, Transformer and Bus Zone Protection.

				5. Describe the Principle of circuit interruption in CBs, different types of circuit breakers and describe the construction and operating principle of different types of fuses.protection against overvoltages.
37		7	Solar and Wind Energy (18EE731)	1. Discuss the importance of the role of renewable energy, the concept of energy storage and the principles of energy storage devices.
				2. Discuss the concept of solar radiation data and describe the process of harnessing solar energy and its applications in heating and cooling.
				3. Discuss solar PV system fabrication, operation of solar cell, sizing and design of PV system.
				4. Discuss the performance of Wind-machines, energy storage, applications of Wind Energy and environmental aspects.
				5. Explain basic Principles of Wind Energy Conversion, collection of wind data, energy estimation and site selection.
38		7	Utilization of Electrical Power (18EE742)	1. Discuss the different methods of electric heating & Electric welding, with their applications.
				2. Discuss the laws of electrolysis and illumination, practical applications of electrolysis and lighting schemes.
				3. Analyse the systems of electric traction, S-T curves and mechanics of train movement.
				4. Explain the traction motors, their control & braking, power supply system used for electric traction.
				5. Explain the configurations of electric vehicles, their performance study and

			7		concept of hybrid electric drive trains, with their architectures.
39			7	Electrical Energy Conservation and Auditing (18EE754)	1. Analyse energy scenario nationwide and worldwide also analyse energy conservation act 2001
					2. Discuss load management techniques and energy efficacy
					3. Understand need of energy audit and energy audit methodology, conduct energy audit of electrical systems and buildings.
					4. Show an understanding of dsm
					5. Apply energy conservation techniques to different sectors.
40			7	PSS laboratory (18EEL76)	1. Develop programs in suitable package to formulate bus admittance and bus impedance matrices of interconnected power systems.
					2. Develop a program in suitable package to assess the performance of medium and long transmission lines.
					3. Develop a program in suitable package to assess the transient stability under three phase fault at different locations in a of radial power systems.
					4. Use suitable package to solve power flow problem for simple power systems.
					5. Use of suitable package to study optimal generation scheduling problems for thermal powerplants.
41			7	Relay & HV lab (18EEL77)	1. Verify the characteristics of over current, over voltage, under voltage relay both electromagnetic and static type.
					2. Analyze the spark over characteristics for both uniform and non-uniform configurations using High AC and DC voltages.

				3. Measure high AC and DC voltages and breakdown strength of transformer oil.
				4. Draw electric field and measure the capacitance of different electrode configuration models.Show knowledge of protecting generator, motor and feeders.
42		7	Project Work Phase - 1 (18EEP78)	1. Demonstrate a sound technical knowledge of their selected project topic
				2. Undertake problem identification, formulation and solution
				3. Design engineering solutions to complex problems utilising a systematic approach
				4. Communicate with engineers and the community at large in written an oral forms
				5. Demonstrate the knowledge, skills and attitudes of a professional engineer
43		8	Power System Operation and Control (18EE81)	1. Describe various levels of controls in power systems, architecture and configurationof SCADA.
				2. Develop and analyze mathematical models of Automatic Load Frequency Control.
				3. Develop mathematical model of Automatic Generation Control in Interconnected Powersystem
				4. Discuss the Control of Voltage , Reactive Power and Voltage collapse.
				5. Explain security, contingency analysis, state estimation of power systems.
44		8	Electrical Power Quality (18EE825)	1. Define Power quality; evaluate power quality procedures and standards.
				2. Estimate voltage sag performance; explain principles of protection and Sources of transient over voltages.

				3. Identify various sources of harmonics, explain effects of harmonic distortion.
				4. Evaluate harmonic distortion, control harmonic distortion.
				5. Estimate power quality in distribution planning. Identify power quality issues in utility system.
45		8	Internship (18EEI85)	1. Gain practical experience within industry in which the internship is done.
				2. Apply knowledge and skills learned to classroom work.
				3. Develop a greater understanding about career options while more clearly defining personalcareer goals.
				4. Experience the activities and functions of professionals.
				5. Develop and refine oral and written communication skills.
46		8	Project Work Phase - 2 (18EEP83)	1. Select the Engineering tool/components for solving the identified engineering problem
				2. Apply the identified concepts and engineering tools to arrive at design solutions for the identified engineering problem
				3. Analyze and interpret results of experiments/ simulations conducted on the designed solutions to arrive at valid conclusion
				4. Engage in effective oral and written communication through presentation of the project work
				5. perform in the team, contribute to the team and mentor/lead the team and follow professional ethics

Sl.No	Branch	Sem	Subject	CO,S
47		8	Technical Seminar (18EES84)	1. Attain, use and develop knowledge in the field of engineering and other disciplines through independent learning and collaborative study
				2. Improve oral and written communication skills
				3. Explore an appreciation of the self in relation to its larger diverse social and academic contexts and Apply principles of ethics and respect in interaction with others

2021 Scheme

Sl.No	Branch	Sem	Subject	CO,S
1	EEE	3	Transform Calculus, Fourier Series and Numerical Techniques (21MAT31)	1. To have an insight into solving ODE by using Laplace Transform techniques.
				2. Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory
				3. To use Fourier transform to analyze problems involving continuous time signals and to apply Z-T techniques to solve DEs.
				4. To solve mathematical models represented by initial or boundary values problems involving PDE .
				5. Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.
2	EEE	3	Analog Electronics Circuits and Op-Amps (21EE32)	1. Obtain the output characteristics of clipper and clamper circuits. Design biasing circuits for transistor amplifiers.

				2. Explain the concept of Multi stage and feedback, its types and design of multi stage and feedback circuits.
				3. Design and analyse the power amplifier and FET circuits.
				4. Design and analysis of Op-amp as active filters and DC voltage regulator
				5. Design and analysis of Op-amp as signal generator, comparators and converters.
3	EEE	3	Electric Circuit Analysis (21EE33)	1. Understand 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.
				2. Solve complex electric circuits using network theorems.
				3. Discuss resonance in series and parallel circuits and also the importance of initial conditions and their evaluation.
				4. Synthesize typical waveform's using Laplace transformation
				5. Solve unbalanced three phase systems and also evaluate the performance of two port networks.
4	EEE	3	Transfomer and Generators (21EE34)	1. Understand the construction and operation of 1-phase, 3-Phase transformers, and Auto transformer.
				2. Analyze the performance of transformers by polarity test, Sumpner's Test, phase conversion, 3-phase connection, and parallel operation.
				3. Understand the construction and working of AC and DC Generators

				4. Analyze the performance of the AC Generators on infinite bus and parallel operation
				5. Determine the regulation of AC Generator by Slip test, EMF, MMF, and ZPF Methods.
5	EEE	3	Electrical Machines Laboratory-1 (21EEL35)	1. Understand the construction and operation of 1-phase, 3-Phase transformers, and Auto transformer.
				2. Analyze the performance of transformers by polarity test, Sumpner's Test, phase conversion, 3-phase connection, and parallel operation.
				3. Understand the construction and working of AC and DC Generators
				4. Analyze the performance of the AC Generators on infinite bus and parallel operation
				5. Determine the regulation of AC Generator by Slip test, EMF, MMF, and ZPF Methods.
6	EEE	3	Social Connect and Responsibility (21SCR36)	1. Understand social responsibility
				2. Practice sustainability and creativity
				3. Showcase planning and organizational skills
7	EEE	3	Circuit laboratory using Pspice (21EEL382)	1. Analyse in an intelligent manner
				2. Think better, and perform better.
8	EEE	4	Maths for Communication Engineers (21MAT41)	1. Use the concept of Analytic function and complex potential to solve the problems in electromagnetic theory and complex integration in airfoil and image processing.
				2. Obtain series solution ODEs

				3. Fit an appropriate mathematical model for the statistical data by using correlation and regression analysis.
				4. Apply discrete and continuous probability distribution in engg. field
				5. Construct joint probability distribution and testing the hypothesis
9	EEE	4	Digital System Design (21EE42)	1. Understand the switching equations generated from truth table and simplification of K-map.
				2. Design of combinational logic circuits Adders, Subtractor, Comparators, Decoders, Encoders and Multiplexers.
				3. Analyse latches, Flipflops and Registers.
				4. Design of Synchronous Counters.
				5. Design Mealy and Moore Synchronous sequential circuits models and construct state diagrams for sequential circuits.
10	EEE	4	Microcontroller (21EE43)	1. Outline the 8051 architecture, registers, internal memory organization, addressing modes.
				2. Discuss 8051 addressing modes, instruction set of 8051, accessing data and I/O port programming.
				3. Develop 8051C programs for time delay, I/O operations, I/O bit manipulation, logic and arithmetic operations, data conversion and timer/counter programming.
				4. Summarize the basics of serial communication and interrupts, also develop 8051

				programs for serial data communication and interrupt programming.
				5.Program 8051to work with external devices for ADC, DAC, Stepper motor control, DC motor control.
11	EEE	4	Electric Motors (21EE44)	1. Explain the construction, operation and classification of DC Motor, AC motor and Special purpose motors.
				2. Describe the performance characteristics & applications of Electric motors
				3. Demonstrate and explain the methods of testing of DC machines and determine losses and efficiency
				4. Control the speed of DC motor and induction motor.
				5. Explain the starting methods, equivalent circuit and phasor diagrams, torque angle, effect of change in excitation and change in load, hunting and damping of synchronous motors.
12	EEE	4	Universal Human Values (21UH49)	1. Understand and analyse the essentials of human values and skills, self-exploration, happiness and prosperity.
				2. Evaluate coexistence of the "I" with the body.
				3. Identify and evaluate the role of harmony in family, society and universal order.
				4. Understand and associate the holistic perception of harmony at all levels of existence.
				5. Develop appropriate technologies and management patterns to create harmony inprofessional and personal lives.

13	EEE	4	Constitution of India and Professional Ethics (21CIP47)	1. To know about the basic structure of Indian Constitution.
				2. To know the Fundamental Rights (FR's), DPSP's and Fundamental Duties (FD's) of our constitution.
				3. To know about our Union Government, political structure & codes, procedures.
				4. To know the State Executive & Elections system of India.
				5.To learn the Amendments and Emergency Provisions, other important provisions given by the constitution
14	EEE	4	Electrical Machines Laboratory-2 (21EEL46)	1. Test DC machines to determine their characteristics and also to control the speed of DC motor
				2. Pre-determine the performance characteristics of DC machines by conducting suitable tests.
				3. Perform load test on single phase and three phase induction motor to assess its performance.
				4. Conduct test on induction motor to pre-determine the performance characteristics.
				5. Conduct test on synchronous motor to draw the performance curves.