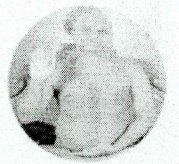




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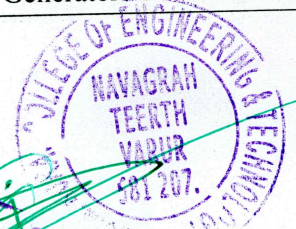
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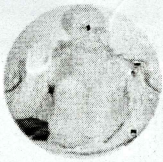
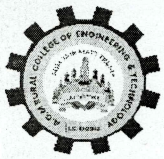


DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
CO STATEMENT FOR THE SCHEME 2018 (BATCH 2018-2022)

SL.NO	SUB NAME	COs	CO Statement
III SEM			
1	Transform Calculus, Fourier Series and Numerical Techniques	18MAT31.1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
		18MAT31.2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
		18MAT31.3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
		18MAT31.4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
		18MAT31.5	Determine the external of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.
2	Electric Circuit Analysis	18EE32.1	Understand the basic concepts, basic laws and methods of analysis of DC and AC networks. Reduce the complexity of network using source shifting, source transformation and network reduction using transformations.
		18EE32.2	Solve complex electric circuits using network theorems. Discuss resonance in series and parallel circuits,
		18EE32.3	Discuss the importance of initial conditions and their evaluation.
		18EE32.4	Synthesize typical waveforms using Laplace transformation
		18EE32.5	Evaluate the performance of two port networks.
3	Transformers and Generators	18EE33.1	Understand the construction and operation of 1-phase, 3-Phase transformers and Autotransformer.
		18EE33.2	Analyze the performance of transformers by polarity test, Sumpner's Test, phase conversion, 3-phase connection, and parallel operation.
		18EE33.3	Understand the construction and working of AC and DC Generators.
		18EE33.4	Analyze the performance of the AC Generators on infinite

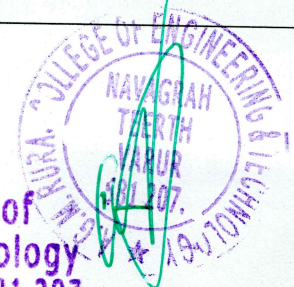
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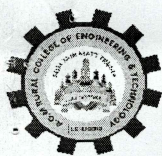


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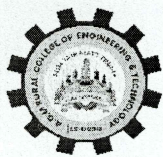
			bus and parallel operation.
			Determine the regulation of AC Generator by Slip test, EMF, MMF, and ZPF Methods.
4	Analog Electronic Circuits	18EE34.1	Obtain the output characteristics of clipper and clamper circuits. · Design and compare biasing circuits for transistor amplifiers & explain the transistor switching.
		18EE34.2	Design and compare biasing circuits for transistor amplifiers & explain the transistor switching.
		18EE34.3	Explain the concept of feedback, its types and design of feedback circuits
		18EE34.4	Design and analyze the power amplifier circuits and oscillators for different frequencies
		18EE34.5	Design and analysis of FET and MOSFET amplifiers.
5	Digital System Design	18EE35.1	Develop simplified switching equation using Karnaugh Maps and QuineMcClusky techniques.
		18EE35.2	Design Multiplexer, Encoder, Decoder, Adder, Subtractors and Comparator as digital combinational control circuits.
		18EE35.3	Design flip flops, counters, shift registers as sequential control circuits
		18EE35.4	Develop Mealy/Moore Models and state diagrams for the given clocked sequential circuits
		18EE35.5	Explain the functioning of Read only and Read/Write Memories, Programmable ROM, EPROM and Flash memory.
6	Electrical and Electronics Measurements	18EE36.1	Measure resistance, inductance and capacitance using bridges and determine earth resistance.
		18EE36.2	Explain the working of various bridges and study the comparison of different bridges.
		18EE36.3	Explain the working of various meters used for measurement of Power
		18EE36.4	Understand the adjustments, calibration & errors in energy meters.
		18EE36.5	Explain methods of extending the range of instruments & instrument transformers and magnetic measurement.
7	Electrical Machines Laboratory - 1	18EEL37.1	Evaluate the performance of transformers from the test data obtained.
		18EEL37.2	Connect and operate two single phase transformers of different KVA rating in parallel.
		18EEL37.3	Connect single phase transformers for three phase operation and phase conversion.

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CO STATEMENT FOR THE SCHEME 2018 (BATCH 2018-2022)

		18EEL37.4	Compute the voltage regulation of synchronous generator using the test data obtained in the laboratory.
		18EEL37.5	Evaluate the performance of synchronous generators from the test data and assess the performance of synchronous generator connected to infinite bus
8	Electronics Laboratory	18EEL38.1	Design and test rectifier circuits with and without capacitor filters.
		18EEL38.2	Determine h-parameter models of transistor for all modes.
		18EEL38.3	Design and test BJT and FET amplifier and oscillator circuits.
		18EEL38.4	Realize Boolean expressions, adders and subtractors using gates.
		18EEL38.5	Design and test Ring counter/Johnson counter, Sequence generator and 3 bit counters
IV SEM			
9	Complex Analysis, Probability and Statistical Methods	18MAT41.1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory
		18MAT41.2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
		18MAT41.3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field
		18MAT41.4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
		18MAT41.5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis
10	Power Generation and Economics	18EE42.1	Describe the working of hydroelectric, steam, nuclear power plants and state functions of major equipment of the power plants.
		18EE42.2	Classify various substations and explain the functions of major equipments in substations.
		18EE42.3	Explain the types of grounding and its importance.
		18EE42.4	Infer the economic aspects of power system operation and its effects.
		18EE42.5	Explain the importance of power factor improvement
11	Transmission and Distribution	18EE43.1	Explain transmission and distribution scheme, identify the importance of different transmission systems and types of



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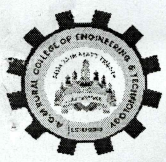


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CO STATEMENT FOR THE SCHEME 2018 (BATCH 2018-2022)

			insulators
		18EE43.2	Analyze and compute the parameters of the transmission line for different configurations
		18EE43.3	Assess the performance of overhead lines
		18EE43.4	Interpret corona, explain the use of underground cables
		18EE43.5	Classify different types of distribution systems; examine its quality & reliability
12	Electric Motors	18EE44.1	Explain the construction, operation and classification of DC Motor, AC motor and Special purpose motors.
		18EE44.2	Describe the performance characteristics & applications of Electric motors.
		18EE44.3	Demonstrate and explain the methods of testing of DC machines and determine losses and efficiency
		18EE44.4	Control the speed of DC motor and induction motor.
		18EE44.5	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
13	Electromagnetic Field Theory	18EE45.1	Use different coordinate systems, Coulomb's Law and Gauss Law for the evaluation of electric fields produced by different charge configurations.
		18EE45.2	Calculate the energy and potential due to a system of charges & Explain the behavior of electric field across a boundary conditions.
		18EE45.3	Explain the Poisson's, Laplace equations and behavior of steady magnetic fields
		18EE45.4	Explain the behavior of magnetic fields and magnetic materials.
		18EE45.5	Asses time varying fields and propagation of waves in different media.
14	Operational Amplifiers and Linear Ics	18EE46.1	Describe the characteristics of ideal and practical operational amplifier.
		18EE46.2	Design filters and signal generators using linear ICs.
		18EE46.3	Demonstrate the application of Linear ICs as comparators and rectifiers.
		18EE46.4	Analyze voltage regulators for given specification using op-amp and IC voltage regulators

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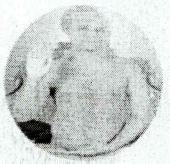




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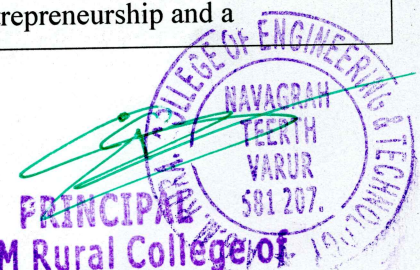
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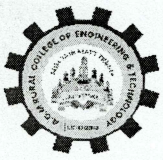
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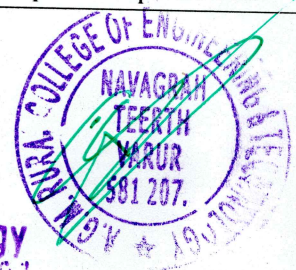
		18EE46.5	Summarize the basics of PLL and Timer.
15	Electrical Machine Laboratory-2	18EE47.1	Test DC machines to determine their characteristics and also to control the speed of DC motor.
		18EE47.2	Pre-determine the performance characteristics of DC machines by conducting suitable tests.
		18EE47.3	Perform load test on single phase and three phase induction motor to assess its performance
		18EE47.4	Conduct test on induction motor to pre-determine the performance characteristics.
		18EE47.5	Conduct test on synchronous motor to draw the performance curves.
16	Operational Amplifiers and Linear Ics Laboratory	18EE48.1	To conduct experiment to determine the characteristic parameters of OP-Amp
		18EE48.2	To design test the OP-Amp as Amplifier, adder, subtractor, differentiator and integrator.
		18EE48.3	To design test the OP-Amp as oscillators and filters
		18EE48.4	Design and study of Linear IC's as multivibrator power supplies.
17	Additional Mathematics -II	18MATDIP41.1	Solve systems of linear equations using matrix algebra.
		18MATDIP41.2	Apply the knowledge of numerical methods in modelling and solving engineering problems.
		18MATDIP41.3	Make use of analytical methods to solve higher order differential equations.
		18MATDIP41.4	Classify partial differential equations and solve them by exact methods
		18MATDIP41.5	Apply elementary probability theory and solve related problems.
V SEM			
18	Management And Entrepreneurship	18EE51.1	Explain the field of management, task of the manager, planning and steps in decision making.
		18EE51.2	Discuss the structure of organization, importance of staffing, leadership styles, modes of communication, techniques of coordination and importance of managerial control in busines
		18EE51.3	Explain the concepts of entrepreneurship and a

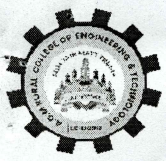

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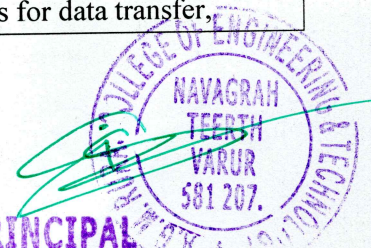
			businessman's social responsibilities towards different groups.
		18EE51.4	Show an understanding of role of SSI's in the development of country and state/central level institutions/agencies supporting business enterprises
		18EE51.5	Discuss the concepts of project management, capital budgeting, project feasibility studies, need for project report and new control techniques
19	Microcontroller	18EE52.1	Outline the 8051 architecture, registers, internal memory organization, addressing modes.
		18EE52.2	Discuss 8051 addressing modes, instruction set of 8051, accessing data and I/O port programming
		18EE52.3	Develop 8051C programs for time delay, I/O operations, I/O bit manipulation, logic and arithmetic operations, data conversion and timer/counter programming
		18EE52.4	Summarize the basics of serial communication and interrupts, also develop 8051 programs for serial data communication and interrupt programming
		18EE52.5	Program 8051 to work with external devices for ADC, DAC, Stepper motor control, DC motor control, Elevator control.
20	Power Electronics	18EE53.1	To give an overview of applications power electronics, different types of power semiconductor devices, their switching characteristics, power diode characteristics, types, their operation and the effects of power diodes on RL circuits.
		18EE53.2	To explain the techniques for design and analysis of single phase diode rectifier circuits.
		18EE53.3	To explain different power transistors, their steady state and switching characteristics and limitations
		18EE53.4	To explain different types of Thyristors, their gate characteristics and gate control requirements
		18EE53.5	To explain the design, analysis techniques, performance parameters and characteristics of controlled rectifiers, DC-DC, DC -AC converters and Voltage controllers
21	Signals & Systems	18EE54.1	Explain the generation of signals, behavior of system and the basic operations that can be performed on signals and properties of systems.
		18EE54.2	Apply convolution in both continuous and discrete domain for the analysis of systems given impulse response of a

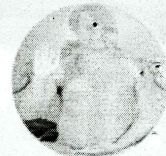
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CO STATEMENT FOR THE SCHEME 2018 (BATCH 2018-2022)

			system
		18EE54.3	Solve the continuous time and discrete time systems by various methods and their representation by block diagram.
		18EE54.4	Perform Fourier analysis for continuous and discrete time, linear time invariant systems.
		18EE54.5	Apply Z-transform and properties of Z transform for the analysis of discrete time systems
22	Electrical Machine Design	18EE55.1	Identify and list, limitations, modern trends in design, manufacturing of electrical machines and properties of materials used in the electrical machines
		18EE55.2	Derive the output equation of DC machine, discuss selection of specific loadings and magnetic circuits of DC machines, design the field windings of DC machine, and design stator and rotor circuits of a DC machine
		18EE55.3	Derive the output equations of transformer, discuss selection of specific loadings, estimate the number of cooling tubes, no load current and leakage reactance of core type transformer.
		18EE55.4	Develop the output equation of induction motor, discuss selection of specific loadings and magnetic circuits of induction motor, design stator and rotor circuits of a induction motor.
		18EE55.5	Formulate the output equation of alternator, design the field windings of Synchronous machine, discuss short circuit ratio and its effects on performance of synchronous machines, design salient pole and non-salient pole alternators for given specifications
23	High Voltage Engineering	18EE56.1	Explain conduction and breakdown phenomenon in gases, liquid dielectrics and breakdown phenomenon in solid dielectrics
		18EE56.2	Summarize generation of high voltages and currents
		18EE56.3	Outline measurement techniques for high voltages and currents.
		18EE56.4	Summarize overvoltage phenomenon and insulation coordination in electric power systems
		18EE56.5	Explain non-destructive testing of materials and electric apparatus, high-voltage testing of electric apparatus
24	Microcontroller	18EEL57.1	Write assembly language programs for data transfer.

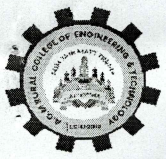


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CO STATEMENT FOR THE SCHEME 2018 (BATCH 2018-2022)**

	Laboratory		arithmetic, Boolean and logical instructions and code conversions.
		18EEL57.2	Write ALP using subroutines for generation of delays, counters, configuration of SFRs for serial communication and timers
		18EEL57.3	Perform interfacing of stepper motor and dc motor for controlling the speed, elevator, LCD, external ADC and temperature control.
		18EEL57.4	Generate different waveforms using DAC interface
		18EEL57.5	Work with a small team to carryout experiments using microcontroller concepts and prepare reports that present lab work
25	Power Electronics Laboratory	18EEL58.1	Obtain static characteristics of semiconductor devices to discuss their performance.
		18EEL58.2	Trigger the SCR by different methods
		18EEL58.3	Verify the performance of single phase controlled full wave rectifier and AC voltage controller with R and RL loads
		18EEL58.4	Control the speed of a DC motor, universal motor and stepper motors
		18EEL58.5	Verify the performance of single phase full bridge inverter connected to resistive load.
26	Environmental Studies	18CIV59.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
		18CIV59.2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
		18CIV59.3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components
		18CIV59.4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issue
		18CIV59.5	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
VI SEM			
27	Control Systems	18EE61.1	Analyze and model electrical and mechanical system using

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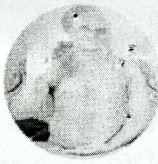
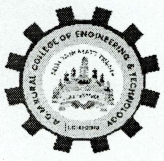
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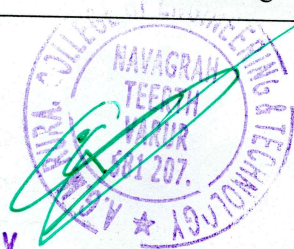
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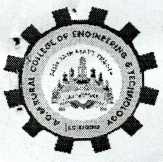
			analogous.
		18EE61.2	Formulate transfer functions using block diagram and signal flow graphs.
		18EE61.3	Analyze the stability of control system, ability to determine transient and steady state time response.
		18EE61.4	Illustrate the performance of a given system in time and frequency domains, stability analysis using Root locus and Bode plots.
		18EE61.5	Discuss stability analysis using Nyquist plots, Design controller and compensator for a given specification
28	Power System Analysis	18EE62.1	Model the power system components & construct per unit impedance diagram of power system
		18EE6122	Analyze three phase symmetrical faults on power system
		18EE62.3	Compute unbalanced phasors in terms of sequence components and vice versa, also develop sequence networks
		18EE62.4	Analyze various unsymmetrical faults on power system.
		18EE62.5	Examine dynamics of synchronous machine and determine the power system stability
29	Digital Signal Processing	18EE63.1	Apply DFT and IDFT to perform linear filtering techniques on given sequences to determine the output.
		18EE63.2	Apply fast and efficient algorithms for computing DFT and inverse DFT of a given sequence
		18EE63.3	Design and realize infinite impulse response Butterworth and Chebyshev digital filters using impulse invariant and bilinear transformation techniques.
		18EE63.4	Develop a digital IIR filter by direct, cascade, parallel, ladder and FIR filter by direct, cascade and linear phase methods of realization
		18EE63.5	Design and realize FIR filters by use of window function and frequency sampling method.
30	Embedded Systems	18EE644.1	Identify the Embedded system components.
		18EE644.2	Apply technological aspects to various interfacing with devices.
		18EE644.3	Elaborate various design trade-offs
		18EE644.4	Apply software aspects and programming concepts to the design of Embedded System.
		18EE644.5	Explain how to interface subsystems with external

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**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
CO STATEMENT FOR THE SCHEME 2018 (BATCH 2018-2022)**

			systems.
31	Renewable Energy Resources	18EE653.1	Discuss causes of energy scarcity and its solution, energy resources and availability of renewable energy
		18EE653.2	Outline energy from sun, energy reaching the Earth's surface and solar thermal energy applications.
		18EE653.3	Discuss types of solar collectors, their configurations, solar cell system, its characteristics and their applications.
		18EE653.4	Explain generation of energy from hydrogen, wind, geothermal system, solid waste and agriculture refuse. Discuss production of energy from biomass, biogas.
		18EE653.5	Summarize tidal energy resources, sea wave energy and ocean thermal energy
32	Control Systems Laboratory	18EEL66.1	Utilize software package and discrete components in assessing the time and frequency domain response of a given second order system
		18EEL66.2	Design, analyze and simulate Lead, Lag and Lag – Lead compensators for given specifications
		18EEL66.3	Determine the performance characteristics of ac and DC servomotors and synchro-transmitter receiver pair used in control systems
		18EEL66.4	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.
		18EEL66.5	Develop a script files to plot Root locus, Bode plot and Nyquist plot to study the stability of
33	Digital Signal Processing Laboratory	18EEL67.1	Explain physical interpretation of sampling theorem in time and frequency domains.
		18EEL67.2	Evaluate the impulse response of a system
		18EEL67.3	Perform convolution of given sequences to evaluate the response of a system.
		18EEL67.4	Compute DFT and IDFT of a given sequence using the basic definition and/or fast methods
		18EEL67.5	Provide a solution for a given difference equation.
34	Mini Project	18EEP68.1	Present the mini-project and be able to defend it.
		18EEP68.2	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.
		18EEP68.3	Habituated to critical thinking and use problem solving



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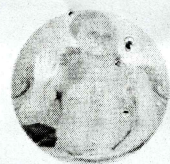
		skills	
		18EEP68.4	Communicate effectively and to present ideas clearly and coherently in both the written and oral forms
		18EEP68.5	Work in a team to achieve common goal.
VII			
35	Power System Analysis-2	18EE71.1	Formulate network matrices and models for solving load flow problems.
		18EE71.2	Perform steady state power flow analysis of power systems using numerical iterative techniques
		18EE71.3	Solve issues of economic load dispatch and unit commitment problems.
		18EE71.4	Analyze short circuit faults in power system networks using bus impedance matrix.
		18EE71.5	Apply Point by Point method and Runge Kutta Method to solve Swing Equation
36	Power System Protection	18EE72.1	Discuss performance of protective relays, components of protection scheme and relay terminology over current protection
		18EE72.2	Explain the working of distance relays and the effects of arc resistance, power swings, line length and source impedance on performance of distance relays
		18EE72.3	Discuss pilot protection, construction, operating principles and performance of differential relays and discuss protection of generators, motors, transformer and Bus Zone Protection.
		18EE72.4	Explain the construction and operation of different types of circuit breakers.
		18EE72.5	Outline features of fuse, causes of overvoltages and its protection, also modern trends in Power System Protection
37	Solar & Wind	18EE731.2	Discuss the importance of the role of renewable energy, the concept of energy storage and the principles of energy storage devices.
		18EE731.2	Discuss the concept of solar radiation data and solar PV system fabrication, operation of solar cell, sizing and design of PV system.
		18EE731.3	Describe the process of harnessing solar energy and its applications in heating and cooling
		18EE731.4	Explain basic Principles of Wind Energy Conversion, collection of wind data, energy estimation and site



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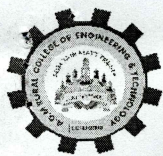


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			selection.
		18EE731.5	Discuss the performance of Wind-machines, energy storage, applications of Wind Energy and environmental aspects
38	Utilization Of Electrical Power	18EE742.1	Discuss different methods of electric heating & welding.
		18EE742.2	Discuss the laws of electrolysis, extraction, refining of metals and electro deposition process.
		18EE742.3	Discuss the laws of illumination, different types of lamps, lighting schemes and design of lighting systems
		18EE742.4	Analyze systems of electric traction, speed time curves and mechanics of train movement
		18EE742.4	Explain the motors used for electric traction, their control & braking and power supply system used for electric traction.
39	Disasters Management	18EE753.1	Discuss disaster management plan, cyclones and their hazard potential
		18EE753.2	Understand the role of IMD and cyclone prediction and cyclone warning system in India
		18EE753.3	Understand the role of different institutions defence and other services in natural disaster management
		18EE753.4	Understand the role of Central Water Commission in river water sharing, Draught, its assessment and draught management plan
		18EE753.5	Understand occurrence of earth quake, Tsunamis and thunderstorms.
40	Power System Simulation Laboratory	18EEL76.1	Develop a program in suitable package to assess the performance of medium and long transmission lines.
		18EEL76.2	Develop a program in suitable package to obtain the power angle characteristics of salient and non-salient pole alternator
		18EEL76.3	Develop a program in suitable package to assess the transient stability under three phase fault at different locations in a of radial power systems.
		18EEL76.4	Develop programs in suitable package to formulate bus admittance and bus impedance matrices of interconnected power systems.
		18EEL76.5	Use suitable package to solve power flow problem for simple power systems.
		18EEL76.6	Use suitable package to study unsymmetrical faults at different locations in radial power systems

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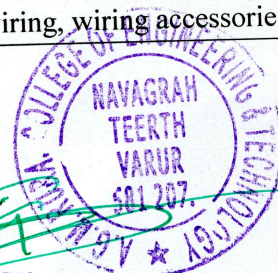
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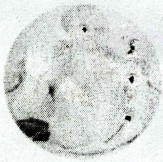


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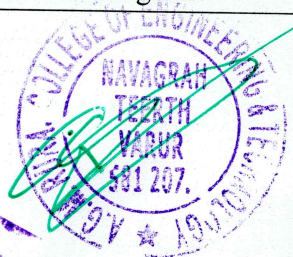
41	Relay And High Voltage Laboratory	18EEL77.1	Verify the characteristics of over current, over voltage, under voltage and negative sequence relay both electromagnetic and static type
		18EEL77.2	Verify the characteristics of microprocessor based over current, over voltage, under voltage relays and distance relay.
		18EEL77.3	Show knowledge of protecting generator, motor and feeders.
		18EEL77.4	Analyze the spark over characteristics for both uniform and non-uniform configurations using High A and DC voltages
		18EEL77.5	Measure high AC and DC voltages and breakdown strength of transformer oil
		18EEL77.6	Draw electric field and measure the capacitance of different electrode configuration models.
		18EEL77.7	Show knowledge of generating standard lightning impulse voltage to determine efficiency, energy of impulse generator and 50% probability flashover voltage for air insulation
42	Project Phase-I	18EEP78.1	Demonstrate a sound technical knowledge of their selected project topic.
		18EEP78.1	Undertake problem identification, formulation and solution.
		18EEP78.1	Design engineering solutions to complex problems utilizing a systems approach.
		18EEP78.1	Communicate with engineers and the community at large in written an oral forms
VIII			
43	Power System Operation And Control	18EE81.1	Describe various levels of controls in power systems, architecture and configuration of SCADA.
		18EE81.2	Develop and analyze mathematical models of Automatic Load Frequency Control
		18EE81.3	Develop mathematical model of Automatic Generation Control in Interconnected Power system
		18EE81.4	Discuss the Control of Voltage , Reactive Power and Voltage collapse
		18EE81.5	Explain security, contingency analysis, state estimation of power systems
44	Electrical Estimation And	18EE822.1	Discuss wiring methods, cables used, design of lighting points and sub-circuits, internal wiring, wiring accessories

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	Costing		and fittings, fuses and types.
		18EE22.2	Discuss estimation of service mains and power circuits.
		18EE822.3	Discuss estimation of overhead transmission and distribution system its components.
		18EE822.4	Discuss types of substation, main components and estimation of substation.
45	Project Work Phase -II	18EEP83.1	Present the project and be able to defend it.
		18EEP83.2	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.
		18EEP83.3	Habituated to critical thinking and use problem solving skills
		18EEP83.4	Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.
		18EEP83.5	Work in a team to achieve common goal.
		18EEP83.6	Learn on their own, reflect on their learning and take appropriate actions to improve it.
46	Technical Seminar	18EES84.1	Attain, use and develop knowledge in the field of engineering and other disciplines through independent learning and collaborative study.
		18EES84.2	Identify, understand and discuss current, real-time issues.
		18EES84.3	Improve oral and written communication skills.
		18EES84.4	Explore an appreciation of the self in relation to its larger diverse social and academic contexts.
		18EES84.5	Apply principles of ethics and respect in interaction with others
47	Internship	18EEI85.1	Gain practical experience within industry in which the internship is done.
		18EEI85.2	Acquire knowledge of the industry in which the internship is done.
		18EEI85.3	Apply knowledge and skills learned to classroom work
		18EEI85.4	Develop a greater understanding about career options while more clearly defining personal career goals.



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