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ELECTRICAL & ELECTRONICS ENGINEERING

PROGRAMME : **B.TECH (EEE)**		DEGREE: **UG**	**REG: R18(II,III) & R16(IV)** **A.Y: 2020-21** **SEMESTER: I AND II**
S.No	**Year/ Sem**	**Course Name**	**Course Outcomes**
1	**II-I**	**Engineering Mechanics (EE301ES)**	**CO 1**: Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
			CO 2: Solve problem of bodies subjected to friction.
			CO 3: Find the location of centroid and calculate moment of inertia of a given section.
			CO 4: Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
			CO 5: Solve problems using work energy equations for translation, fixed axis rotation and plane motion and solve problems of vibration.
2	**II-I**	**Electrical Circuit Analysis (EE302PC)**	**CO 1**: Apply network theorems for the analysis of electrical circuits.
			CO 2: Obtain the transient and steady-state response of electrical circuits.
			CO 3: Analyze circuits in the sinusoidal steady-state (single-phase and three-phase).
			CO 4: Analyze two port circuit behavior.
			CO 5: Analyze circuits by using Laplace Transform
3	**II-I**	**Analog Electronics (EE303PC)**	**CO 1**: Know the characteristics, utilization of various components.
			CO 2: Understand the biasing techniques
			CO 3: Design and analyze various rectifiers, small signal amplifier circuits.
			CO 4: Design sinusoidal and non-sinusoidal oscillators.
			CO 5: A thorough understanding, functioning of OP-AMP, design OP-AMP based circuits with linear integrated circuits.
4	**II-I**	**Electrical Machines - I (EE304PC)**	**CO 1**: Identify different parts of a DC machine & understand its operation
			CO 2: Carry out different testing methods to predetermine the efficiency of DC machines
			CO 3: Understand different excitation and starting methods of DC machines
			CO 4: Control the voltage and speed of a DC machines

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			CO 5: Analyze single phase and three phase transformers circuits.
5	**II-I**	**Electromagnetic Fields (EE305PC)**	**CO 1**: To understand the basic laws of electromagnetism.
			CO 2: To obtain the electric and magnetic fields for simple configurations under static conditions.
			CO 3: To analyze time varying electric and magnetic fields.
			CO 4: To understand Maxwell's equation in different forms and different media.
			CO 5: To understand the propagation of EM waves.
6	**II-I**	**Electrical Machines Lab - I (EE306PC)**	**CO 1**: Start and control the Different DC Machines.
			CO 2: Assess the performance of different machines using different testing methods
			CO 3: Identify different conditions required to be satisfied for self - excitation of DC Generators.
			CO 4: Separate iron losses of DC machines into different components
7	**II-I**	**Analog Electronics Lab (EE307PC)**	**CO 1**: Know the characteristics, utilization of various components.
			CO 2: Understand the biasing techniques
			CO 3: Design and analyze various rectifiers, small signal amplifier circuits.
			CO 4: Design sinusoidal and non-sinusoidal oscillators.
			CO 5: A thorough understanding, functioning of OP-AMP, design OP-AMP based circuits with linear integrated circuits.
8	**II-I**	**Electrical Circuits Lab (EE308PC)**	**CO 1**: Analyze complex DC and AC linear circuits
			CO 2: Apply concepts of electrical circuits across engineering
			CO 3: Evaluate response in a given network by using theorems
10	**II-II**	**Laplace Transforms, Numerical Methods & Complex variables (MA401BS)**	**CO 1**: Use the Laplace transforms techniques for solving ODE's and Find the numerical solutions for a given ODE's
			CO 2: Find the root of a given equation.
			CO 3: Estimate the value for the given data using interpolation
			CO 4: Taylor's and Laurent's series expansions of complex function
			CO 5: Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems

11	**II-II**	**Electrical Machines-II (EE402PC)**	**CO 1**: Understand the concepts of rotating magnetic fields.
			CO 2: Understand the operation of ac machines.
			CO 3: Analyze performance characteristics of ac machines.
			CO 4: Explain the role of synchronous generators operation when connected to an infinite bus or when operating in parallel
			CO 5: Analyze the performance of single phase induction and ac series motors
12	**II-II**	**Digital Electronics (EE403PC)**	**CO 1**: Understand working of logic families and logic gates.
			CO 2: Design and implement Combinational logic circuits.
			CO 3: Design and implement Sequential logic circuits.
			CO 4: Understand the process of Analog to Digital conversion and Digital to Analog conversion.
			CO 5: Be able to use PLDs to implement the given logical problem.
13	**II-II**	**Control Systems (EE404PC)**	**CO 1**: Understand the modeling of linear-time-invariant systems using transfer function and state- space representations.
			CO 2: Understand the concept of stability and its assessment for linear-time invariant systems.
			CO 3: Understand the concept of stability and its assessment for Frequency-Response systems.
			CO 4: Test system controllability and observability using state space representation and applications of state space representation to various systems
			CO 5: Design simple feedback controllers.
14	**II-II**	**Power System - I (EE405PC)**	**CO 1**: Understand the concepts of power systems.
			CO 2: Understand the operation of conventional generating stations and renewable sources of electrical power.
			CO 3: Evaluate the power tariff methods.
			CO 4: Determine the electrical circuit parameters of transmission lines
			CO 5: Understand the layout of substation and underground cables and corona.
15	**II-II**	**Digital Electronics Lab (EE406PC)**	**CO 1**: Understand working of logic families and logic gates.
			CO 2: Design and implement Combinational and Sequential logic circuits.

			CO 3: Understand the process of Analog to Digital conversion and Digital to Analog conversion.
			CO 4: Be able to use PLDs to implement the given logical problem.
16	**II-II**	**Electrical Machines Lab - II (EE407PC)**	**CO 1**: Assess the performance of different machines using different testing methods
			CO 2: To convert the Phase from three phase to two phase and vice versa
			CO 3: Compensate the changes in terminal voltages of synchronous generator after estimating the change by different methods
			CO 4: Control the active and reactive power flows in synchronous machines
			CO 5: Start different machines and control the speed and power factor
17	**II-II**	**Control Systems Lab (EE408PC)**	**CO 1**: How to improve the system performance by selecting a suitable controller and/or a compensator for a specific application
			CO 2: Apply various time domain and frequency domain techniques to assess the system performance
			CO 3: Apply various control strategies to different applications (example: Power systems, electrical drives etc)
			CO 4: Test system controllability and observability using state space representation and applications of state space representation to various systems
18	**III- I**	**Power Electronics (EE501PE)**	**CO 1**: Understand the differences between signal level and power level devices.
			CO 2: Analyze controlled rectifier circuits.
			CO 3: Analyze the operation of DC-DC choppers.
			CO 4: Analyze the operation of voltage source inverters.
			CO 5: Analyze the operation of voltage source Converter.
19	**III- I**	**Power Systems – II (EE502PE)**	**CO 1**: Analyze transmission line performance.
			CO 2: Apply load compensation techniques to control reactive power
			CO 3: Understand the application of per unit quantities.
			CO 4: Design over voltage protection and insulation coordination
			CO 5: Determine the fault currents for symmetrical and unbalanced faults
20	**III- I**	**Measurements**	**CO 1**: Understand different types of measuring

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		and Instrumentation (EE503PE)	instruments, their construction, operation and characteristics
			CO 2: Calibrate PMMC instrument using D.C potentiometer
			CO 3: Identify the instruments suitable for typical measurements
			CO 4: Apply the knowledge about transducers and instrument transformers to use them effectively.
			CO 5: Apply the knowledge of smart and digital metering for industrial applications
21	**III- I**	**High Voltage Engineering (EE512PE)**	**CO 1**: Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.
			CO 2: Knowledge of generation and measurement of D. C., A.C., & Impulse voltages.
			CO 3: To be able to apply knowledge for measurement of high voltage and high current AC,DC and Impulse.
			CO 4: Knowledge of tests on H. V. equipment and on insulating materials, as per the standards.
			CO 5: Knowledge of how over-voltages arise in a power system, and protection against these over- voltages.
22	**III- I**	**Business Economics and Financial Analysis (SM504MS)**	**CO 1**: Understand the various Forms of Business and the impact of economic variables on the Business.
			CO 2: To learn Demand, Supply, Production, Cost, Market Structure, Pricing aspects.
			CO 3: To study the firm's financial position by analysing the Financial Statements of a Company.
			CO 4: understand the various Forms of Business and the impact of economic variables on the Business.
			CO 5: Understand the Financial Analysis through Ratios.
23	**III-I**	**Power System Simulation Lab (EE505PC)**	**CO 1**: Perform various transmission line calculations
			CO 2: Understand Different circuits time constants
			CO 3: Analyze the experimental data and draw the conclusions.
24	**III-I**	**Power Electronics Lab (EE506PC)**	**CO 1**: Understand the Financial Analysis through Ratios.
			CO 2: Use power electronic simulation packages& hardware to develop the power converters.
			CO 3: Analyze and choose the appropriate converters for various applications
25	**III-I**	**Measurements and Instrumentation Lab (EE507PC)**	**CO 1**: To choose instruments
			CO 2: Test any instrument
			CO 3: Find the accuracy of any instrument by performing experiment

			CO 4: Calibrate PMMC instrument using D.C potentiometer
26	**III-I**	**Advanced Communication Skills Lab (EN508HS)**	**CO 1**: To improve students' fluency in spoken English spoken at normal conversational speed
			CO 2: To help students develop their vocabulary
			CO 3: To read and comprehend texts in different contexts and communicate their ideas relevantly and coherently in writing
			CO 4: To make students industry-ready
			CO 5: To help students acquire behavioral skills for their personal and professional life
27	**III-II**	**Non Conventional Energy Sources (MT601OE)**	**CO 1**: Knowledge of working principle of various energy systems
			CO 2: Understand the principles of wind power and solar photovoltaic power generation, fuel cells.
			CO 3: Understand the principles of Bio-mass and Geothermal
			CO 4: Assess the cost of generation for conventional and renewable energy plants
			CO 5: Design suitable power controller for wind and solar applications
28	**III-II**	**Power Semiconductor Drives (EE612PE)**	**CO 1**: Identify the drawbacks of speed control of motor by conventional methods.
			CO 2: Differentiate Phase controlled and chopper-controlled DC drives speed-torque characteristics merits and demerits
			CO 3: Understand Ac motor drive speed–torque characteristics using different control strategies its merits and demerits
			CO 4: Describe Slip power recovery schemes
			CO 5: Explain the fundamentals of electric drive and different electric braking methods.
29	**III-II**	**Signals and systems lab (EE607PC)**	**CO 1**: Differentiate various signal functions.
			CO 2: Represent any arbitrary signal in time and frequency domain.
			CO 3: Understand the characteristics of linear time invariant systems.
			CO 4: Graphical and analytical proof for Sampling theorem and its Correlation
			CO 5: Analyze the signals with different transform technique
30	**III-II**	**Microprocessors &**	**CO 1**: Understands the internal architecture, organization and assembly language programming of

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		Microcontrollers (EE602PC)	8086 processors.
			CO 2: Understands the internal architecture, organization and assembly language programming of 8051/controllers
			CO 3: Understands the interfacing techniques to 8086 and 8051 based systems.
			CO 4: Understands the internal architecture of ARM processors
			CO 5: Understands the basic concepts of advanced ARM processors.
31	**III-II**	**Power System Protection (EE603PC)**	**CO 1**: Compare and contrast electromagnetic, static and microprocessor-based relays
			CO 2: Apply technology to protect power system components.
			CO 3: Select relay settings of over current and distance relays.
			CO 4: Analyze quenching mechanisms used in air, oil and vacuum circuit breakers
			CO 5: Generates understanding of different types of static relays with a view to application in the system.
32	**III-II**	**Power system operation and control (EE604PC)**	**CO 1**: Understand operation and control of power systems.
			CO 2: Analyze various functions of Energy Management System (EMS) functions.
			CO 3: Analyze whether the machine is in stable or unstable position.
			CO 4: Able to find out the load flow solution of a power system network using different types of load flow methods.
			CO 5: Understand power system deregulation and restructuring
33	**III-II**	**Power system lab (EE605PC)**	**CO 1**: Perform various load flow techniques
			CO 2: Understand Different protection methods
			CO 3: Analyze the experimental data and draw the conclusions.
34	**III-II**	**Microprocessors & Microcontrollers lab (EE606PC)**	**CO 1**: Understands the internal architecture and organization of 8086, 8051 and ARM processors/controllers.
			CO 2: Understands the interfacing techniques to 8086 and 8051 and can develop assembly language programming to design microprocessor/ micro controller based systems.
35	**III-II**	**Signals and systems lab**	**CO 1:** Understand the concepts of continuous time and discrete time systems.

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		(EE607PC)	**CO 2:** Analyse systems in complex frequency domain.
			CO 3: Understand sampling theorem and its implications.
36	**IV-1**	**Power Semiconductor Drives (EE701PC)**	**CO 1:** Indentify the drawbacks of speed control of motor by conventional methods.
			CO 2: Differentiate Phase controlled and chopper controlled DC drives speed-torque characteristics merits and demerits
			CO 3: Understand Iduction motor drive speed–torque characteristics using different control strategies its merits and demerits
			CO 4: Describe Slip power recovery schemes
			CO 5: Understand Synchronous motor drive speed–torque characteristics using different control strategies its merits and demerits
37	**IV-I**	**Power System Operation and Control (EE702PC)**	**CO 1:** Analyze the optimal scheduling of power plants
			CO 2: Analyze the steady state behavior of the power system for voltage and frequency fluctuations
			CO 3: Understand unit commitment problem and importance of economic load dispatch
			CO 4: Describe reactive power control of a power system
			CO 5: Design suitable controller to dampen the frequency and voltage steady state oscillations
38	**IV-1**	**HVDC Transmission (EE722PE) (Professional Elective – II)**	**CO 1:** Compare EHV AC and HVDC system and to describe various types of DC links
			CO 2: Analyze Graetz circuit for rectifier and inverter mode of operation
			CO 3: Describe various methods for the control of HVDC systems and to perform power flow analysis in AC/DC systems
			CO 4: Describe various protection methods for HVDC systems
			CO 5: Describe classify Harmonics and design different types of filters
39	**IV-1**	**Power Quality (EE732PE) (Professional Elective – III)**	**CO 1:** Know the severity of power quality problems in distribution system
			CO 2: Understand the concept of voltage sag transformation from up-stream (higher voltages) to down-stream (lower voltage)
			CO 3: Concept of improving the power quality to sensitive load by various mitigating custom power devices

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40	**IV-1**	**Flexible A.C. Transmission Systems (EE743PE) (Professional Elective – IV)**	**CO 1:** Choose proper controller for the specific application based on system requirements
			CO 2: Understand various systems thoroughly and their requirements
			CO 3: Understand the Objectives of shunt compensation
			CO 4: Understand the control circuits of Shunt Controllers SVC & STATCOM for various functions viz. Transient stability Enhancement, voltage instability prevention and power oscillation damping
			CO 5: Understand the Power and control circuits of Series Controllers GCSC, TSSC and TCSC
41	**IV-I**	**Electrical Systems simulation lab (EE703PC)**	**CO 1:** Design and Analyze electrical systems in time and frequency domain
			CO 2: Analyze various transmission lines and perform fault analysis
			CO 3: Model Load frequency control of Power Systems
			CO 4: Design various Power Electronic Converters and Drives.
42	**IV-I**	**EE704PC: ELECTRICAL WORKSHOP**	**CO 1:** Get practical knowledge related to electrical
			CO 2: Fabricate basic electrical circuit elements/networks
			CO 3: Trouble shoot the electrical circuits
			CO 4: Design filter circuit for application
			CO 5: Get hardware skills such as soldering, winding etc.
			CO6: Get debugging skills.
43	**IV-II**	**Renewable Energy SourcesMT831OE**	**CO 1:** Understanding of renewable energy sources
			CO 2: Knowledge of working principle of various energy systems
			CO 3: Capability to carry out basic design of renewable energy systems
44	**IV-II**	**Electrical Distribution Systems (EE852PE)**	**CO 1:** distinguish between transmission, and distribution line and design the feeders
			CO 2: Understant Objectives of protection coordination
			CO 3: compute power loss and voltage drop of the feeders
			CO 4: design protection of distribution systems
			CO 5: understand the importance of voltage control and power factor improvement
45	**IV-II**	**Utilization of Electric Power (EE863PE)**	**CO 1:** Acquire knowledge on, electric drives characteristics and their applicability in industry based on the nature of different types of loads and their

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			characteristics
			CO 2: understands the concepts and methods of electric heating, welding, illumination and electric traction
			CO 3: Able to determine the speed/time characteristics of different types of traction motors.
			CO 4: Able to estimate energy consumption levels at various modes of operation.
			CO 5: apply the above concepts to real-world electrical and electronics problems and applications.

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