### Koneru Lakshmaiah Education Foundation





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# DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING PROGRAM DEVELOPMENT DOCUMENT B. Tech, 2020-21

### Vision of University:

To be a globally renowned university.

### Mission of University:

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

### **Vision of Department:**

To produce globally renowned leaders in academics, extension activities, research and technology development in frontier areas of Electronics and Electrical Engineering and allied fields.

### **Mission of Department:**

To produce quality electrical and electronics engineers with abundant theoretical foundation, innovative thinking, and accurate design experience, exposure to research and development and awareness of social / sociological needs.

### **Program Educational Objectives**

- PEO-1: Acquiring engineering knowledge in a wide range of industrial, societal and real world applications
- PEO-2: Pursuing advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers
- PEO-3: Managing themselves in a committed professional and ethical manner
- PEO-4: Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world.

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(Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

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### **Mission statements:**

M1: Training the leaders of future

M2: Training the innovators of coming days

M3: Training the outstanding career professionals of future

M4: Conducting fundamental research

### **Academic Goals**:

G1: To offer academic flexibility by means of Choice based credit systems and the like.

G2: To identify and introduce new specializations and offer programs in emerging areas therein

G3: To incorporate into the curriculum the Application orientation and use high standards of competence for academic delivery

G4: To design and implement educational system adhering to outcome based International models.

G5: To introduce and implement innovation in teaching and learning process to strengthen academic delivery

G6: To offer academic programs at UG, PG, doctoral, Post-Doctoral which are industry focused, and incorporates Trans-discipline, inter-discipline aspects of the education system

G7: To deliver higher education that includes technologies and meeting the global requirements

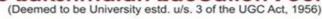
### **Program Outcome (POs)**

PO-1: Ability to apply knowledge of mathematics, science, engineering fundamentals and engineering specialization for the solution of complex engineering problems.

PO-2: Ability to identify, formulate, research literature, analyze complex engineering problems using first principles of mathematics, natural sciences and engineering sciences.

PO-3: Ability to find solutions for complex engineering problems and system component of processes that meet the specified needs considering public health, safety and cultural, societal & environment.

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PO-4: Ability to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to obtain solutions to critical engineering problems.

PO-5: Ability to create, select and apply appropriate techniques, resources and modern engineering activities, with an understanding of the limitations.

PO-6: Ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7: Ability to demonstrate the knowledge of engineering solutions, contemporary issues understanding their impacts on societal and environmental contexts, leading towards sustainable development.

PO-8: Ability to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO-9: Ability to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

PO-10: Ability to communicate effectively verbal, written reports and graphical forms on complex engineering activities.

PO-11: Ability to demonstrate knowledge and understanding of the engineering and management principles and apply those one's own work, as a member and leader in team, to manage projects and in multi-disciplinary environments.

PO-12: Ability to recognize the need and having the preparation and ability to engage independent and life-long learning in the broadest context of technological change.

### **Program Specific Outcome's:**

PSO-1: Ability to demonstrate the knowledge, skill to analyze the cause and effect on Electrical system, processes and systems

PSO-2: Ability to apply the acquired Electrical Engineering knowledge for the advancement of society and self



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### **Mapping of PEOs with GOALS:**

DEO			Ac	cademic Go	als		
PEOs	G1	G2	G3	G4	G5	G6	G7
PEO-1				$\sqrt{}$	$\sqrt{}$		$\checkmark$
PEO-2							√
PEO-3							
PEO-4							

### MAPPING OF PEOs with MISSION OF THE DEPARTMENT:

			Key Compo	onents of Missio	n
		M 1	M 2	M 3	M 4
S. No	Description of PEOs	Training the leaders of tomorro w	Training the innovators of tomorrow	Training the outstanding career professionals of tomorrow	Conducting fundamental research
PEO-1	Acquiring engineering knowledge in a wide range of industrial, societal and real world applications		. ✓	. ✓	
PEO-2	Pursuing advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers		✓		✓
PEO-3	Managing themselves in a committed professional and ethical manner	✓			
PEO-4	Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world.	<b>✓</b>		<b>✓</b>	<b>✓</b>



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### **MAPPING OF POs/PSOs with PEOs:**

	NG OF POS/PSOS V	vitii I LOS.	Description	of PEO	
S No.	Key Components of POs and PSOs	Acquiring engineering knowledge in a wide range of industrial, societal and real world applications	Pursuing advanced education, research and development, and other creative and innovative efforts in science, engineering, and technology, as well as other professional careers	Managing themselves in a committed professional and ethical manner	Participate as leaders in their fields of expertise and in activities that support service and economic development throughout the world.
		PEO 1	PEO 2	PEO 3	PEO 4
PO1	Engineering knowledge	✓	✓		✓
PO2	Problem analysis	<b>√</b>	✓		<b>√</b>
PO3	Design/ development of solutions	✓	✓		✓
PO4	Conduct investigations of complex problems	<b>√</b>	✓		✓
PO5	Modern tool usage	✓	1		✓
PO6	The engineer and society	✓	✓	✓	✓
PO7	Environment and sustainability	✓	✓	✓	<b>✓</b>
PO8	Ethics	<b>√</b>	<b>√</b>	<b>✓</b>	<b>√</b>
PO9	Individual and team work	✓	✓	✓	✓
PO10	Communication	✓	✓	<b>√</b>	<b>✓</b>



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PO11	Project management and finance				<b>✓</b>
PO12	Lifelong learning	✓	✓	✓	✓
PSO1	Ability to demonstrate the knowledge, skill to analyze the cause and effect on Electrical system, processes and systems	✓	<b>√</b>		<b>✓</b>
PSO2	Ability to apply the acquired Electrical Engineering knowledge for the advancement of society and self	✓	✓		<b>✓</b>



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### MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES (POs) and PROGRAM SPECIFIC OUTCOMES (PSOs)

				Pro	gra	m (	Out	con	nes							PS(	)
Course Code	Course Title	CO NO	Description of the Course Outcome	1	2	3	4	5	6	7	8	9	10	1	12	1	2
		CO1	Understand the concepts of grammar to improve communication, reading, and writing skills										1				
20UC1101	INTEGRATED PROFESSIONAL	CO2	Demonstrate required knowledge over Dos and Don'ts of speaking in the corporate context. Demonstrate ability to face formal situations / interactions.									1					
	ENGLISH	CO3	Understand the varieties of reading and comprehend the tone and style of the author. Skim and scan effectively and appreciate rhetorical devices									1					
		CO4	Apply the concepts of writing to draft corporate letters, emails, and memos										1				
20UC1202	ENGLISH PROFICIENCY	CO1	Demonstrating different interpersonal skills for employability								1						
		CO2	Distinguishing business essential skills									1					

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		CO3	Classifying social media and corporate communication skills							1	
		CO4	Applying analytical thinking skills							2	
		CO1	Developing critical and analytical reading skills							1	
		CO2	Discovering different interpersonal skills to develop people skills							1	
20UC2103	PROFESSIONAL COMMUNICATION SKILLS	CO3	To enhance the problem-solving skills of the students through the concepts of Simple Equations, Ratio, Proportion & Variation, Percentages, Profit & Loss, Averages, Allegations, Simple & Compound Interest.			1					
		CO4	Apply diagrammatic representation of the given data to find the possible outcomes in the topics of Deductions, Cubes, Venn Diagrams and Arrangements	1							
20UC2204	CORPORATE COMMUNICATION SKILLS	CO1	To distinguish product and process and quote them in speaking and writing activities							1	

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		CO2	To apply interpersonal skills							1	
		CO3	To enhance the problem-solving skills of the students through the concepts of Numbers, Time & Work, Time & Distance, Permutations & Combinations, Probability which will enable them to improve their problem solving abilities which in turn improve their programming skills.			1					
		CO4	To apply known facts to find the unknowns in the topics Clocks, Calendars, Binary Logic. Identify the rule set by analyzing the given observations in the topics Series, Analogy, Odd Man, Coding-Decoding	1							
20UC3005	APTITUDE BUILDER	CO1	To discuss and interpret English language skills necessary for placements							1	
20003003	AL THOOL BUILDER	CO2	To demonstrate skills to get selected in interviews and retain job							1	

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		CO3	To enhance the problem-solving skills of the students through the concepts of Mensuration, Quadratic Equations & Inequalities, Progressions, Logarithms, Data Interpretation, Data Sufficiency which will enable them to improve their problem-solving abilities which in turn improve their programming skills.				1					
		CO4	To apply deductive logic to solve questions in Connectives, Blood relations, Ranking and time sequence, Symbols and notations. Apply principles of reflection and rotation to solve picture puzzles.		1							
		CO1	To familiarize with various aspects of the culture and heritage of India through ages.	1								
20UC0007	INDIAN HERITAGE AND CULTURE	CO2	To acquaint with the contributions of Indians in the areas of languages and literature, religion and philosophy	1								
		CO3	To understand the Social	1								

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			structure and the spread of Indian culture abroad							
		CO4	To know the development of Science and Technology in India through ages and to appreciate the contributions of some of the great Indian scientists	1						
		CO1	To understand Constitutional development after Independence						1	
		CO2	To learn the fundamental features of the Indian Constitution						1	
20UC0008	INDIAN CONSTITUTION	CO3	To get a brief idea of the powers and functions of Union and State Governments						1	
		CO4	To understand the basics of working of Indian Judiciary and the Election Commission						1	
	ECOLOGY AND	CO1	Understand the importance of Environmental education and conservation of natural resources.			1				
20UC0009	ENVIRONMENT	CO2	Understand the importance of ecosystems and biodiversity						1	
		CO3	Apply the environmental science knowledge on			2				

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			Transcent Trope, Coronospes, Tr					ı	ı		a.
			solid waste management, disaster management and EIA process								
		CO4	Understand the importance of Environmental education and conservation of natural resources			1					
		CO1	Understand and identify the basic aspiration of human beings				1				
20UC0010	UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS	CO2	Envisage the roadmap to fulfill the basic aspiration of human beings.				2				
		CO3	Analyze the profession and his role in this existence.				2				
		CO1	Analyze the business environment in order to identify business opportunities,						2		
2011/00/11	ENTDEDDENELIDCHID	CO2	Identify the elements of success of entrepreneurial ventures						1		
20UC0011	ENTREPRENEURSHIP	CO3	Consider the legal and financial conditions for starting a business venture						1		
		CO4	Evaluate the effectiveness of different entrepreneurial strategies						2		

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		CO1	Model a system of equations for real world applications in engineering, physical and biological sciences, computer science, finance, economics and solve them through matrix algebra	2							
20MT1101	MATHEMATICS FOR COMPUTING	CO2	Model basic and computational techniques on discrete structures like relations, orders, functions & FSM, Lattices, and propositional & predicate logic	2							
		CO3	Model real world structures and their related applications using advanced discrete structures like graphs and trees.	2							
		CO4	Model the given Statistical data for real world applications in Engineering science, Economics and Management.	2							
		CO5	Demonstrate the Aptitude and Reasoning skills (Tests in skilling hours)	1							
20SC1102	INTRODUCTION TO DESIGN	CO1	Be able to understand elements and principles of design		1			1			

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	16-1										4
		CO2	Able to grasp stage model of action cycle		2			2			
		CO3	Be able to understand design laws and their importance in design field		1			1			
		CO4	To comprehend various rules of composition of design		2			2			
		CO5	To gain hands-on experience of fundamentals of design		2			2			
		CO1	Apply differential and integral calculus to find maxima & minima of functions, evaluate the integrals and solve the differential equations.	2							
19MT2102	MATHEMATICS FOR ENGINEERS	CO2	Demonstrate the Fourier series and Laplace transforms.  Describe	1							
		CO3	probability, Random Variables	1							
		CO4	Explain complex variables, analytic functions and introduction to stochastic process and Algebraic structures.	1							
20EE2104	Mathematical Transforms for	CO1	Understand basic concepts related to Signals and Systems	2							
	Signal Processing	CO2	Apply Fourier series and transforms to	2							

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	1077												-8
			various periodic and aperiodic waveforms										
		CO3	Apply Laplace transforms and its properties to various signals	2									
		CO4	Apply Z transforms and its properties to various signals	2									
		CO1	Understand the different roles and responsibilities in phases of User centered Design			1				1			
20SC1203	USER CENTRIC DESIGN TECHNIQUES	CO2	Identify user pain points and opportunity areas through empathy and collaborative design			1				1			
		CO3	To be able to design a better User Experience using UCD and 6D process			2				2			
		CO1	Understand the basics of design thinking and its implications in product or service development	1									
20SC2104	DESIGN THINKING	CO2	Understand and Analyze the requirements of a typical problem		2								
20302104	AND INNOVATION	CO3	Plan the necessary activities towards solving the problem through ideation and prototyping				2	2			2		
		CO4	evaluate the solution and refine them based on the			3				3			

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			customer feedback									
		CO1	Acquire the Knowledge of basic biology				1	1				
19BT1001	BIOLOGY FOR ENGINEERS	CO2	Acquire the Knowledge of Human Biological Systems				1	1				
		CO3	Acquire Knowledge on Microorganisms and Biosensors				1	1				
		CO1	Design Basic and Complex Building Blocks for real world problems using structured programming paradigm.	2	2							
		CO2	Translate computational thinking into Logic Design for Solving real world problems.	2	2							
20SC1101	COMPUTATIONAL THINKING FOR DESIGN	CO3	Apply and Analyse CRUD operations on Basic Data Structures using Asymptotic Notations.	2	2							
		CO4	Apply and Analyse CRUD operations on Linear Data Structures using Asymptotic Notations.			2						
		CO5	Apply the structured programming paradigm with logic building skills on Basic and Linear Data Structures for solving real world problems.	2	2	2						

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		CO1	Practice design thinking by developing artistic skills, Visualize and complete his/her innovative design by final drafting using 3D modeling		2						
20ME1103	DESIGN TOOLS WORKSHOP -I	CO2	Understand the concept of web page, web browser, web server, and able to create Static webpages			2					
		CO3	Understand the concept of report writing using a markup language Latex			2					
		CO4	Understand the concept of data visualization and creating data visualization dashboards, Understand the basic concept of VR/AR.			2					
		CO1	Apply measures of efficiency to algorithms and Compare various linear data structures like Stack ADT, Queue ADT, Linked lists.	2	2						
20SC1202	DATA STRUCTURES	CO2	Analyze and compare linear data structures and analyze different searching and hashing techniques	2	2						
		CO3	Analyze and compare various non – linear data	2	2						

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			structures like Trees and Graphs									
		CO4	Analyze and compare various sorting algorithms, to select from a range of possible options, to provide justification for that selection, and to implement the algorithm in a particular context.	2	2							
		CO5	Execute lab experiments and develop a small project along with his/her team members.	2	2							
		CO1	Practice the design ideology by artistic skill		1							
		CO2	Visualize the design ideology by using VR technology			2						
19SC1209	DESIGN TOOLS WORKSHOP -II	CO3	Visualize the design ideology by incorporating VR technique				2					
		CO4	Visualize and present his design idea by applying AR technique			2						
19SC1203	Object Oriented Programming	CO1	Understand Basic Concepts of OOP, introduction to classes and objects through Java Language and apply.	1								
		CO2	Understand the concepts of constructors, Overloading,	1								

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			parameter passing, access control, Inheritance and apply										
		CO3	Understand Packages, Interfaces, and Exception Handling and apply.	2									
		CO4	Understand I/O Streams & apply and understand Basic Concepts of Multi – Threading	2	2								
		CO1	Understand two port network parameters and their relations		1								
		CO2	Analyze the transient behaviour of DC / AC circuits			1	1						
19EE2101	ELECTRICAL CIRCUITS	CO3	Understand the network topology and apply three phase circuit balanced and unbalanced circuits			1		1					
		CO4	Understand magnetic circuit behaviour in series and parallel circuits			1						1	
19PH1006	Materials & Measurements (Science Elective-1)	CO1	Understands structure of crystalline solids and appreciates structure property relationship in crystals.			2							
		CO2	Understands the role of electronic energy band structures of solids in	2		2		2					2

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			governing various electrical properties of materials.									
		CO3	Apply the concepts of spin and orbital motion of electrons in determining magnetic properties of materials,the role in classifications & materials used for MEMS and power electronics.		2	2					2	2
		CO4	Apply the Basic fundamentals of a measurement system to estimate voltage, current, power, energy etc.		2	2					2	2
		CO5	Apply the knowledge on structure and properties of materials while executing related experiments and develop some inter disciplinary projects.				2					
19CY1101	Engineering Chemistry (Science Elective-2)	CO1	Predict potential complications from combining various chemicals or metals in an engineering setting	2								
	Licetive=2)	CO2	Discuss fundamental aspects of electrochemistry and materials science relevant	1								

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			to corrosion phenomena								
		CO3	Examine water quality and select appropriate purification technique for intended problem	2							
		CO4	Explain the role of chemical kinetics in the formation and destruction of ozone in the atmosphere and predict the connection between molecular behavior and observable physical properties.	2							
		CO5	An ability to analyze and generate experimental skills	2							
20EC1101	Digital Logic & Processors	CO1	Describe the concepts of number systems wit h codes and logic gates usage in digital circuit design and identify the logical expressions in different forms and their minimization techniques for logical circuit optimization. Code conversions and digital IC's realization with	1							

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			respect to data sheets									
		CO2	Employ combinational logic crcuits with minimization techniques and logical verification through hardware description language	2	2							
		CO3	Substantiation of sequential logic circuits and logical verification through hardware description language	2								
		CO4	Implementation of digital circuits using PAL, PLA and FPGA. Discriminate the operations of ALU and execution of microinstruction s.	2	2							
		CO5	Analyse the digital IC logic for combinational and sequential circuits implementation			2						
19EC1202	Computer Organization & Architecture	CO1	Understand the functionality and design the CPU functional units - control unit, registers, the arithmetic and logic unit, the instruction execution unit, and the interconnections		2						2	

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			among these components.										
		CO2	Understand, analyze and design main, cache and virtual memory organizations.		2							2	
		CO3	Understand, analyze and design different types of I/O transfer techniques.										
		CO4	Understand the design issues of RISC and CISC CPUs and the design issues of pipeline architectures.			2						2	2
		CO1	Understand the passive circuit elements and it combinations performance in DC circuits using mesh, nodal and theorems.	1	1								
20EE1201	Basic Electrical and Electronic Circuits	CO2	Understand the fundamentals of AC circuits and apply concept of resonance to series and parallel circuits.	2	2								
		CO3	Understand the VI Characteristics of active circuit elements.	2	2								
		CO4	Applications of semiconductor devices	2	2								
		CO5	Test and analyse the electrical and electronics circuits for DC and AC				2						

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25	144											-8
		CO1	Understand the basics of Sensors and Actuators	1								1
		CO2	Understand the Internet of things architecture and applications			1					1	
		CO3	Understand the Internet of things communication and protocols			2						2
19EE2205	Sensors & IOT	CO4	Apply the features of IOT using physical devices & endpoints			2					2	
		CO5	Experiments Related to Sensors and IoT using TINKERCAD online platform and Embedded Hardware		2							2
		CO1	Study of BJT's and Various application in Amplifiers	1		1						1
		CO2	Understand various types of FET's, IC Types and analyze FET as an Amplifier		1							1
19EC2103	Analog Electronics Circuit Design	CO3	Understand the Linear & Non-linear application of Op-AMP and analyze active filters		2						2	
		CO4	Analysis of different types of oscillators, filter and regulators.		2						2	
		CO5	Design and Testing of Analog circuits for realistic applications		2						2	
19EC2106	Embedded Controllers	CO1	Understand the architecture and programming	1	1							

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		1		ı				_	_	ı		
			concepts of 8086 Microprocessor									
		CO2	Apply the Programming concepts of 8051 Microcontroller	2	2							
		CO3	Analyse the Interfacing of Peripherals to the 8051 microcontrollers through programming. Understand the basic architectures of PIC and ARM 7 microcontrollers	1	1							
		CO4	Understand the basic concepts of CORTEX STM-32 microcontroller and RTOS			2						
		CO5	Analyze the applications of programming with 8051 and 8086 on hardware / software. Analyze the applications of programming with Arduino			2						
	Electrical Power	CO1	Understand working of various generating stations and economical aspects of generation			1						
19EE2102	Engineering	CO2	Understand the parameters of overhead transmission lines and underground cables		2							
		CO3	Analyze the performance of			2						

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												4
			overhead transmission lines and AC/DC distribution.									
		CO4	Understand Mechanical Sag, corona, Insulators and substation layouts.		2							
		CO1	Understand the basic principles of electro mechanical energy conversion.	1								
19EE2103	Electrical Machines	CO2	Understand the operating characteristics of various types of DC machines	2								
		CO3	Analyze the performance of DC machines.	2								
		CO4	Analyze the performance of Transformers.	2								
		CO5	Test the performance of DC machines and transformers.	2								
		CO1	Understand the concepts of the 3-phase induction motor.		2						2	
		CO2	Analyze the performance of 3-phase alternator.			2					2	
19EE2201	Industrial Applications of Electrical Machines	CO3	Analyze the performance of 3-phase synchronous motor	2							2	
		CO4	Understand the concepts of 1-phase & special machines.	2							2	
		CO5	Test the performance of				3					3

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	10-1											-8
			AC Rotating Machines									
		CO1	Understand the differences between signal level and power level devices.		2	2					2	
		CO2	Analyse the operation and performance of DC-DC Converters		1	1					1	
19EE2202	Power Electronics	CO3	Analyse the operation and performance of voltage source inverters		1	1					1	
		CO4	Understand the operation of phase controlled converters		1	1					1	
		CO5	Demonstrate and test basic power electronic converters by hardware realization and MATLAB software.		2	2					2	
		CO1	Apply the network matrices for solution of power flow problems	2							2	
19EE2203	Computer Applications in Power Systems	CO2	Apply the reactance diagrams for symmetrical short circuit faults in a power system	2								2
		CO3	Analyze unsymmetrical faults in a power system using Symmetrical components	2							2	
		CO4	Understand various aspects	2								2



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			of power system stability									
		CO1	Understand the basics of Control system components and its modelling.	1			1					
		CO2	Analyse the control systems under time domain and stability analysis.	2			2					
20EE2204	Control Systems	CO3	Analyze the control systems under frequency domain analysis.	1			1					
		CO4	Analyze the state space model equations and Understand the control though PLC	1			1					
		CO5	Test the operation of control systems using software & prototype models			2						
		CO1	Understand the various Industrial Data Communication networks	2								
		CO2	Understand the industrial protocols and standards.	2								
20EE3211 C	INDUSTRIAL COMMUNICATION PROTOCALS & CYBER SECURITY	CO3	Apply the knowledge of cyber-security in industrial and various automation domains.	2								
		CO4	Understand the hacking concepts and counter attacking methods in automation.	2								

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2	140-1										40
		CO1	Understand the IOT terminology, technology	2							
	LOT FOR	CO2	Apply the IOT elements to industrial automation	2							
19EE3112	IOT FOR INDUSTRIAL AUTOMATION	CO3	Understand the concept of M2M (machine to machine) with necessary protocols	2							
		CO4	Apply M2M for industrial automation	2							
		CO1	Understand electric drive system components and dynamics of a drive system.	2							
20EE3113	INDUSTRIAL DRIVES AND CONTROL	CO2	Develop controllers for DC drive systems.	2							
	AND CONTROL	CO3	Develop controllers for AC drive systems.	2							
		CO4	Apply special machine drives for precise industrial processes.	2							
		CO1	Apply the principles of automation to industrial needs	2							
19EE3111	INDUSTRIAL AUTOMATION AND	CO2	Analyze control structure for process automation	2							
	ROBOTICS	CO3	Apply the principles of robotic control for industrail needs	2							
		CO4	Analyze the copntrol of	2							

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												а.
			robotic process conntrol									
		CO1	Understand the basics of smart sensors and micromachining				2					
	SMART SENSORS	CO2	Apply the sensor communication protocols				2					
20EE3213	AND SENSOR NETWORKING	CO3	Apply the packaging, testing and reliability of smart sensors:				2					
		CO4	Understand the wireless sensor networks				2					
		CO1	Understanding the need of Solar PV and Solar Thermal systems	1							1	
	SOLAR PV AND	CO2	Understanding the applications of solar thermal energy systems		2						2	
19EE3121	THERMAL TECHNOLOGIES	CO3	Understand the design aspects of Solar PV system		2						2	
		CO4	Understand the operational issues of grid connected and isolated solar PV system		1						1	
		CO1	Understand the concepts of wind energy conversion and measurement system.	1	1							
19EE3122	WIND AND MICRO ENERGY SOURCES	CO2	Apply the concepts of wind energy system to electric power grid.	2	2							
		CO3	Understand the concepts ofgeothermal energy systems.	2	2							
		CO4	Understand the concepts of tidal,	1	1							

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No.			ocean and bio-								1		
			mass energy										
			systems.										
			Understand										
		CO1	different types of										
		CO1	distributed										
			energy resources			2							1
			Apply the										
		CO2	principles for										l
		CO2	integrating DERs										l
	DISTRIBUTED		to grid			2							
19EE3132	ENERGY RESOURCES		Understand										
13223132	AND SMART GRIDS	CO3	smart grid										l
	7 IIVD SIVI/IIII GIIIDS	603	objectives and its										l
			activities in India			2							
			Understand and										
			monitor various										
		CO4	applications in										
			smart grid with										1
			its smart			_							1
			infrastructure			2							
		CO1	Understand										
		CO1	SCADA and its architecture.		2								
			Understand the										
			application of										
		CO2	SCADA in various										
			utilities.		2								
			Apply the		_								
			knowledge of										l
			energy										l
	ENERGY		management										
2055222	ENERGY	CO3	system in various										
20EE3222	MANAGEMENT		real time										
	SYSTEMS & SCADA		applications on										
			transmission										
			side.		2								
			Apply the										
			knowledge of										
			Demand Side										
		CO4	Management in										
			analyzing various										
			real time										
			applications on										
			distribution side.		2								
	CAAADT CDUD		Understand the										
	SMART GRID	CO1	communication										
20EE3232	COMMUNICATION		technologies for smart grid		2								
	AND							-	-				
	CYBERSECURITY	CO2	Apply the knowledge of		٦								
			vilowieuge 01		2		<u> </u>				<u> </u>		

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			information							
			security in smart							
			grids.  Understand the	$\vdash$						
		CO3	Interoperability							
			and Standards.	2						
			Understand the							
			hacking							
		CO4	techniques and							
			cyber-security in							
			smart grid.	2						
			Understand the computation of							
		CO1	power							
		001	distribution							
			system losses	2						
			Understand the							
			substation							
		CO2	erection and							
		332	commissioning							
	DICTRIBUTION		as per the	,						
19EE3131	DISTRIBUTION SYSTEM PRACTICES		standards Analyze the	2	+		+			
	CIGILIVITIA CHOLD		various							
			protective							
		CO3	devices of							
			distribution							
			system	2						
			Understand the							
		CO4	testing of distribution							
		C04	system							
			equipment	2	2					
			Understand the							
			communication							
		CO1	technology and							
			standards in							
			smart grid Apply the	2	2	-	+			
			Apply the knowledge of							
	SMART GRID	CO2	information							
4055333	COMMUNICATION		security in smart							
19EE3231	AND CYBER		grids.	2	2					
	SECURITY		Understand the							
		CO3	Interoperability							
			and Standards.	2	2	+	+			
			Understand the hacking							
		CO4	techniques and							
			cyber-security in							
			smart grid.	2	2					

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												-81
		CO1	Understand network protocols and standards  Apply IoT in		2							
	INTERNET OF	CO2	smart		2							
20EE3233	THINGS AND SMART GRID ANALYTICS	CO3	Understand various applications of IoT to to Smart Grids		2							
		CO4	Apply Big Data Analytics in smart grid		2							
		CO1	Understand the key components of Battery management systems	2								
19EE3142	BATTERY MODELLING FOR ELECTRIC VEHICLES	CO2	Understand the key functions of Battery management systems		2							
		CO3	Analyze the static battery models		2							
		CO4	Analyze the dynamic battery models		2							
		CO1	Analyze Power electronic converters for electric vehicle charging applications	2								
20EE3241	CHARGING STATION FOR ELECTRIC VEHICLE	CO2	Develop control algorithms for various electric vehicle charging modes				2					
		CO3	Analyze control of Fast charging station					2				
		CO4	Demonstrate installation of charging station			3					3	3
19EE3142	BATTERY STATE ESTIMATION ALGORITHMS FOR ELECTRIC VEHICLE	CO1	Understand the specifications and Li-ion chemistry	2								

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E.										-8
		CO2	Understand the key functions of Battery management systems		2					
		CO3	Develop Enhanced Self Correcting (ESC) Model of battery		2					
		CO4	Develop Algorithms for SOC estimation of battery		2					
		CO1	Demonstrate IoT devices and tools			2				
	AL AND LOT FOR	CO2	Operate the cloud system Environment			2				
19EE3242	AI AND IOT FOR ELECTRIC VEHICLE	CO3	Applying ML Techniques for Electric Vehicles			2				
		CO4	Applying Al techniques for EV Applications			2				
		CO1	Understand the communication protocols used in Electric Vehicles		2					
20552242	COMMUNICATION PROTOCOLS &	CO2	Apply the communication protocols for fault diagnostics of Electric Vehicle		2					
20EE3243	TESTING OF ELECTRIC VEHICLE	CO3	Analyze the intricacies of integrating HV and LV components of vehicle		2					
		CO4	Demonstrate system engineering/syst em validation		2					
19EE3101	AI TECHNIQUES IN ELECTRICAL ENGINEERING	CO1	Understand the neural network models, different architectures with different learning types and various	2		2				

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			algorithms for ANN to solve the load forecasting problems in Power systems								
		CO2	Apply ANN paradigms in Electrical Engineering	2		2					
		CO3	Apply the fuzzy logic concept, fuzzy sets, with suitable membership function with proper defuzzification methods Electrical Engineering	2		2					
		CO4	Apply the different cross over methods and their elitism, convergence of algorithm Electrical Engineering	2		2					
		CO5	Analyze the experiments using ANN	2							
		CO1	Identify the motor ratings for different applications		2						
20EE3105	UTILISATION OF ELECTRICAL ENERGY	CO2	Understand the concepts of electric heating & welding.		2						
		CO3	Compare various illumination methods		2						
		CO4	Apply electrical traction to different services		2						
20EE3202	RESTRUCTERED POWER SYSTEMS	CO1	Understand the concept of deregulated market structures and		2	2					

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			reforms in Indian Power Sector							
		CO2	Apply different techniques for finding available transfer capacity for congestion management		2	2				
		CO3	Analyse transmission pricing methods and effect of congestion on LMPs		2	2				
		CO4	Understand ancillary services and system security in deregulation		2	2				
		CO1	Understand the present power scenario in India and need for energy estimation and Audit.	2	2					
05550044	Energy Estimation &	CO2	Understand the operation of Induction motors and various energy conservation opportunities	2	2					
OEEE0014	Audit	CO3	Understand the basics of transformers, cables and their energy conservation opportunities.	2	2					
		CO4	Understand Lighting systems, pumping systems and their energy conservation opportunities.	2	2					
OEEE0013	Renewable Energy Resources	CO1	Understand and analyze the solar thermal		2	2				

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			applications and solar photovoltaic cells							_
		CO2	Analyze the performance of wind and tidal, wave and Ocean thermal energy conversion systems	2	2					
		CO3	Understand and analyze the operation of geothermal and bio energy conversion	2	2					
		CO4	Understand and analyze the Biogas digesters and bio power plants	2	2					
		CO1	Understand the importance types, sources and disposal methods of Solid waste.				2			
OECE0003		CO2	Summarize the importance of conversion and recycling of waste.				2			
	MANAGEMENT	CO3	Associate about types, Sources of Hazardous waste.				2			
		CO4	Discuss the disposal and treatment methods of Hazardous waste.				2			
20TS3101 E	Technical Proficiency - 1 / Entrepreneurial Incubation	CO1	Implement Python Operators, Conditional statements, Collection Data Types and Functions					2		

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		CO2	Implementing Array through NumPy, Plotting, Visualization through matplotlib and Numerical Methods				2		
		CO3	Implementing OOPS through Python, Data Structures through OOPS, Sci Py, Scikit- Learn, Pandas Libraries				2		
		CO4	Analyse real world applications in Energy management, Electric drives, smart grid and automation using machine learning algorithms with Python				2		
		CO1	Develop schematic and panel drawings for electrical control systems using AutoCAD Electrical.				2		
20TS3202 E	Technical Proficiency - 2 / Technopreneurship	CO2	Analyze various power system scenarios using modelling and analysis software.				2		
		CO3	Apply Sensor Selection and integration to Real-Time IoT Applications using Raspberry Pi.				2		



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Apply ADC, SPI, I <sup>2</sup> C, UART, and PWM protocols for peripheral communication.  CO4 Build electronic solutions with Raspberry Pi Pico microcontroller and use cloud for loT data.	
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#### DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

		DEPARTMENT OF ELEC	IRICAI			LE	CI.	KUI	NICS EN	GI	111			NG								_	
		B.Tech EEE (Y20	Regulation	n) P	rog	ran	n Ar	rticul	lation Mat	<u>rix</u>													
S.No.	Course code	Course Name	Course	L	T	P	S	Cr	Pre-Req.						]	PO						PS	SO
			category							1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	20UC1101	Integrated Professional English	HSS	0	0	4	0	2	NIL								1	1	2				
2	20UC1202	English Proficiency	HSS	0	0	4	0	2	NIL							1	1		1	2			
3	20UC2103	Professional Communication Skills	HSS	0	0	4	0	2	NIL	1			1							1			
4	20UC2204	Corporate Communication Skills	HSS	0	0	4	0	2	NIL	1			1							1			
5	20UC3005	Aptitude Builder	HSS	0	0	4	0	2	NIL	1			1							1			
6	20UC0007	Indian Heritage and Culture	HSS	2	0	0	0	0	NIL	1													
7	20UC0008	Indian Constitution	HSS	2	0	0	0	0	NIL												1		
8	20UC0009	Ecology & Environment	HSS	2	0	0	0	0	NIL						2						1		
9	20UC0010	Universal Human Values & Professional Ethics	HSS	2	0	0	0	0	NIL								2						
10	20UC0011	Entrepreneurship	HSS	2	0	0	0	0	NIL										1	2			



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11	20MT1101	Mathematics for Computing	BS	2	2	0	2	5	NIL	2											
12	20SC1202	Design Thinking and Innovation-I		1	0	0	4	2	NIL			2					2	2			
13	19MT2102	Mathematics for Engineers	BS	2	1	0	0	3	NIL	2											
14	19CY1101	Science Elective-1 (Engineering Chemistry)	BS	3	0	2	0	4	NIL	2				2							
15	20SC2104	Design Thinking and Innovation-II	BS	1	0	0	4	2	NIL	1	2	3	2	2			3	3	2		
16	19PH1006	Science Elective - 2 (Measuements & Materials)	BS	3	0	2	0	4	NIL	3	2			2							
17	19BT1001	Biology for Engineers	BS	3	0	2	0	4	NIL	1			1						1		
18	20SC1101	Computational Thinking for Design	BS	2	0	0	0	2	NIL						1	1					
19	20ME1103	Design Tools Workshop –I	ES	3	0	2	6	6	NIL	2	2		2								
20	20SC1202	Data Structures and Algorithms	ES	0	0	4	0	2	NIL			2		2							
21	20ME1203	Computational Thinking and Data Sciences	ES	3	0	2	3	5	NIL	2		2									
22	19SC1209	Design Tools Workshop –II	ES	3	0	2	3	5	NIL	2	2										



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23	20EE2104	Matematical transforms for Signal Processing	ES	2	1	0	0	3	NIL	3										
24	20EE1201	Basics of Electrical & Electronics Engineering	ES	2	1	0	0	3	NIL	1	2									
25	20EE2101	Electrical Circuits	ES	3	1	0	0	4	NIL	2			2							
26	20EC1101	Digital Logic & Processors	ES	3	0	2	0	4	NIL	2	2		2							
27	20SC2103	Object oriented programming	ES	3	0	2	3	5	NIL	2	2									
28	19EC1202	Computer Organization & Architecture	PC	2	0	0	0	2	NIL	2	2								2	2
29	19EC2103	Analog Electronics Circuit Design	PC	3	0	2	2	5	Nil	1	2	1							2	1
30	19EC2106	Embedded Controllers	PC	2	0	3	2	4	Nil		2	3	2							
31	19EE2102	Electrical Power Engineering	PC	3	1	0	0	4	Nil	3		2							3	
32	19EE2103	Electrical Machines	PC	3	0	2	0	4	Nil	2	2		3						3	
33	19EE2201	Industrial Applications of Electrical Machines	PC	3	0	2	0	4	19EE2103	2			3	3					2	
34	19EE2202	Power Electronics	PC	3	0	2	2	5	20EE1201	2		3	3		3	3		2	3	2



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35	19EE2203	Computer Applications in Power Systems	PC	3	0	2	0	4	19EE2102	2			3							3	
36	19EE2204	Control Systems	PC	3	0	2	2	5	Nil	3	3		3	;						3	2
37	20EE3101	AI TECHNIQUES IN ELECTRICAL ENGINEERING	FC	3	1	0	0	4	19EE2203	2		2	2 2	;				3	3		3
38	20EE3102	ELECTRIC DRIVES	FC	3	1	0	0	4	19EE2202	1	3		2	,						1	
39	20EE3103	RESTRUCTERED POWER SYSTEMS	FC	3	1	0	0	4	19EE2102	1			3	1						2	
40	20EE3104	Power Quality	FC	4	0	0	0	4	Nil	2	3	2	2 3	1						2	
41	20EE3105	UTILISATION OF ELECTRICAL ENERGY	FC	3	1	0	0	4	Nil	2						3				3	1
42	20EE3206	SENSORS AND INTERNET OF THINGS	FC	3	0	2	0	4	Nil	1	1		2	*					2	1	2
43	19EE3121	SOLAR AND MICRO ENERGY TECHNOLOGIES	PE	3	0	0	0	3	NIL	2			2	!						1	
44	19EE3122	WIND AND ENERGY STORAGE TECHNOLOGIES	PE	3	0	0		3	NIL	1	3									2	
45	19EE3123	ENERGY MANAGEMENT AND GREEN BUILDINGS	PE	3	0	0	0	3	NIL		2				2				3	2	1



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46	20EE3221	AI AND IOT FOR GREEN ENERGY INTEGRATION	PE	3	0	0	0	3	NIL		2	1				1	2	1
47	20EE3222	GRID INTEGRATION OF RENEWABLE ENERGY SOURCES	PE	3	0	0	0	3	NIL			1		2			3	
48	19EE3141	POWER TRAIN DESIGN FOR ELECTRIC VEHICLE	PE	3	0	0	0	3	19EE2103				2	3			1	2
49	19EE3142	BATTERY STATE ESTIMATION ALGORITHMS FOR ELECTRIC VEHICLE	PE	3	0	0	0	3	NIL	1		2		2			1	2
50	19EE3143	CHARGING STATIONS FOR ELECTRIC VEHICLES	PE	3	0	0	0	3	19EE2202			2		1			1	2
51	20EE3241	AI AND IOT FOR ELECTRIC VEHICLE	PE	3	0	0	0	3	NIL		2	1	2				1	2
52	20EE3242	COMMUNICATION PROTOCOLS & TESTING OF EV	PE	3	0	0	0	3	NIL		2	1					1	2



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53	19EE3111	INDUSTRIAL AUTOMATION AND ROBOTICS	PE	3	0	0	0	3	NIL	1								2
54	19EE3112	INTRODUCTION TO INDUSTRIAL INTERNET OF THINGS	PE	3	0	0	0	3	NIL	1								2
55	19EE3113	INDUSTRIAL DRIVES AND CONTROL	PE	3	0	0	0	3	19EE2103	1							1	
56	20EE3211	INDUSTRIAL COMMUNICATION PROTOCOLS AND CYBER SECURITY	PE	3	0	0	0	3	NIL	1				1				2
57	20EE3212	SMART SENSORS AND SMART NETWROKING	PE	3	0	0	0	3	NIL	1		1	1					
58	19EE3131	DISTRIBUTION SYSTEM PRACTICES	PE	3	0	0	0	3	19EE2102	2								2
59	19EE3132	DISTRIBUTED ENERGY RESOURCES AND SMART GRIDS	PE	3	0	0	0	3	NIL		2	1	2				1	2
60	19EE3133	ENERGY MANAGEMENT SYSTEMS AND SCADA	PE	3	0	0	0	3	NIL	1			2				1	2



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61	20EE3231	SMART GRID COMMUNICATION AND CYBERSECURITY	PE	3	0	0	0	3	NIL	1		2						2
62	20EE3232	INTERNET OF THINGS AND SMART GRID ANALYTICS	PE	3	0	0	0	3	NIL	1		2					1	2
63	20MB4051	Modelling Business Systems	ME	2	0	0	0	2	Nil				1		3	2	1	
64	20MB4052	Entrepreneurship Essentials	ME	2	0	0	0	2	Nil				1		3	2		1
65	20IE2050	Social internship	PR	0	0	0	8	2	NIL				1	2	2	2		3
66	20IE3050	Technical Internship	PR	0	0	0	8	2	NIL		3		1			2		2
67	20IE3150	Mid Grad Capstone Project – I	PR	0	0	0	8	2	NIL			2						
68	20IE3250	Mid Grad Capstone Project – II	PR	0	0	0	8	2	NIL			2						
69	20IE4150	Capstone Project – I	PR	0	0	0	24	6	NIL		2	3						2
70	20IE4250	Capstone Project – II	PR	0	0	0	24	6	NIL		2	3						2
71	19IE4050	Practice School	PR	0	0	0	24	6	NIL		2	3						2
72	19IE4051	Internship	PR	0	0	0	24	6	NIL		2	3						2



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73	20TS3101	Technical Proficiency - 1 / Entrepreneurial Incubation	PTA	0	0	0	12	3	NIL	1	2	3					2
74	20TS3202	Technical Proficiency - 2 / Technopreneurship	PTA	0	0	0	12	3	NIL	1	2	3					2
75	20TS4103	Technical Proficiency - 3 / Entrepreneural Skilling	PTA	0	0	0	12	0	NIL	1	2	3					2
76	20TS4204	Technical Proficiency - 4 / Entrepreneural Skilling	PTA	0	0	0	12	0	NIL	1	2	3					2
77	19EE40A3	Renewable Energy Sources	OE	3	0	0	0	3	NIL				3	2			
78	19EE40A4	Energy Estimation & Audit	OE	3	0	0	0	3	NIL				3	2			