

I & II SEMESTER

Course Code with Course Name: U23HST11-Communicative English

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C101.1	Remember appropriate words in a situational conversation.
C101.2	Gain understanding of basic grammatical structures and use them in right context.
C101.3	Read and infer the denotative and connotative meanings of technical texts.
C101.4	Write Dialogue, Letter and paragraphs on various topics.
C101.5	Make the students prepare effective notes for main sources available.
C101.6	Enhance them to give operational talk

CO-PO MAPPING

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									3	3		2			
CO2									2	2		3			
CO3									2	3		3			
CO4									2	3		3			
CO5									2	2		2			
CO6									2	3		2			
SUM									13	16		12			
AVG									2.1666	2.6666		2			

Course Code with Course Name: U23MAT12- Matrices and Calculus

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C102.1	Use the matrix algebra methods for solving practical problems.
C102.2	Use both the limit definition and rules of differentiation to differentiate functions
C102.3	Apply differential calculus tools in solving various application problems
C102.4	Able to use differential calculus ideas on several variable functions.
C102.5	Apply multiple integral ideas in solving areas, volumes and other practical problems
C102.6	Solve the ordinary differential equations using different techniques for that model engineering problems.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3			2							2			
CO2	3	3			2							2			
CO3	3	3			1							2			
CO4	3	2			2							2			
CO5	3	3			1							2			
CO6	2	2			1							2			
SUM	17	16			9							12			
AVG	2.8333	2.6666			1.5							2			

Course Code with Course Name: U23PHT13 - Physics for Engineers and Technologist

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C103.1	Differentiate the elastic and plastic nature of the materials.
C103.2	Know the experimental techniques in both production and applications of ultrasonic waves.
C103.3	Gain knowledge in the basics of quantum mechanics concepts.
C103.4	Develop new devices based on LASER source.
C103.5	Understand the advantages of optical fiber than metal wire.
C103.6	Demonstrate the some useful experiments based on optical fibre

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1		3		2					2			
CO2	3	3	1		2		2					2			
CO3	3	2	1		2		2					2			
CO4	3	1	3		3		1					2			
CO5	3	2	2		3		1					3			
CO6	2	3	3		2		2					1			
SUM	17	12	11		15		10					12			
AVG	2.8333	2	1.8333		2.5		1.6					2			

Course Code with Course Name: U23CYT14 - Chemistry for Engineering & Technology

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C104.1	Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.
C104.2	Apply the basic knowledge of Corrosion and various electrodes.
C104.3	Know the economically and new methods of synthesis nano materials.
C104.4	Apply the knowledge of phase rule and composites for material selection requirements.
C104.5	Understand the concepts of suitable fuels for engineering processes and applications.
C104.6	Have the knowledge of different forms of energy resources and apply them for suitable applications in energy sectors.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1		3							2			
CO2	2	2	2		3							2			
CO3	2	2	2		1							3			
CO4	2	2	2		3							1			
CO5	2	1	2		3							1			
CO6	2	2	3		2							2			
SUM	12	10	12		15							11			
AVG	2	1.6666	2		2.5							1.8333			

Course Code with Course Name: U23HSP12 English Laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C107.1	Identify and comprehend complex academic texts.
C107.2	Interpret accurately and fluently in formal and informal communicative contexts.
C107.3	Demonstrate their opinions effectively in both oral and written medium of communication.
C107.4	Plan travelogue and construct paragraphs on various aspects.
C107.5	Develop journal reading skills and small talk.
C107.6	Utilizing technical terms and making power point presentations.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									1	3		2			
CO2									2	3		3			
CO3									2	3		2			
CO4									1	3		3			
CO5									2	3		2			
CO6									2	3		3			
SUM									10	18		15			
AVG									1.6	3		2.5			

Course Code With Course Name: U23GEL14 - Engineering Practices Laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C108.1	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbingwork; Saw; plan; make joints in wood materials used in common household wood work.
C108.2	Wire various electrical joints in common household electrical wire work.
C108.3	Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common
C108.4	Solder and test simple electronic circuits; Assemble and test simple electronic components onPCB
C108.5	Apply fundamental engineering principles to analyze and solve real-world problems.
C108.6	Demonstrate proficiency in using engineering tools and equipment.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		2	2	2	1				1					
CO2	2		2	2	2	1				1					
CO3	2		3	1	2	1				1					
CO4	2		3	1	3	1				1					
CO5	3		3	2	2	1				2					
CO6	2		2	1	3	1				2					
SUM	12		15	9	14	6				8					
AVG	2		2.5	1.5	2.3333	1				1.3333					

Course Code With Course Name: U23HST21 Professional English

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C109.1	Compare and contrast products and ideas in technical texts.
C109.2	Identify cause and effects in events, industrial processes through technical texts.
C109.3	Analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format
C109.4	Motivate students to write reports and winning job applications.
C109.5	Recall and comprehend different discourses and genres of texts.
C109.6	Making the students to become virtuous presenters.

CO-PO MAPPING

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									1	3		2			
CO2									1	2		2			
CO3									2	3		3			
CO4									2	3		2			
CO5									1	2		2			
CO6									3	3		2			
SUM									10	16		13			
AVG									1.6666	2.6666		2.1666			

Course Code with Course Name: U23MAT22- Statistics and Numerical Methods

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C110.1	Apply the concept of testing of hypothesis for small and large samples in real life problems.
C110.2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.
C110.3	Solve the algebraic and transcendental equations.
C110.4	Understand the knowledge of numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
C110.5	Solve the ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.
C110.6	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1		1							2			
CO2	3	2	1		1							2			
CO3	3	3	2		1							2			
CO4	3	3	2		2							2			
CO5	3	3	2		2							2			
CO6	3	3	2		2							2			
SUM	18	17	10		9							12			
AVG	3	2.8333	1.6666		1.5							2			

Course Code with Course Name: U23GET15 Problem solving and Python programming

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C111.1	Develop algorithmic solutions to simple computational problems.
C111.2	Develop and execute simple Python programs.
C111.3	Write simple Python programs using conditionals and loops for solving problems
C111.4	Decompose a Python program into functions
C111.5	Represent compound data using Python lists, tuples, dictionaries etc.
C111.6	Read and write data from/to files in Python programs

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	2	2	2				1	2		3		2	2
CO2		3	2	2	3				1	2		2		2	1
CO3		3	2	2	3				1	2		2		2	2
CO4		2	2	2	3				2	2		2		2	2
CO5		2	2	2	3				1	2		2		2	2
CO6		2	2	2	3				1	2		2		2	2
SUM		15	12	12	17				7	12		13		12	11
AVG		2.5	2	2	2.8333				1.1666	2		2.1666		2	1.8

Course Code with Course Name: U23PHT24-Physics for Electrical and Electronics Engineers

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C112.1	Know basics of crystallography and its importance for varied materials properties.
C112.2	Gain knowledge on the magnetic and superconductor properties of materials and their applications.
C112.3	Use the dielectric and insulating materials in electronic devices.
C112.4	Illustrate the SMA and metallic glasses.
C112.5	Get knowledge on newly developed materials in micro and nano scale.
C112.6	Summarize the different structures of CNT in Nano range

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1		1		1					2	2	1	2
CO2	3	2	1		2		2					2	2	2	1
CO3	3	2	2		2		1					2	3	2	2
CO4	2	2	1		2		1					2	2	1	1
CO5	3	2	2		2		2					3	2	2	2
CO6	3	2	2		3		3					3	2	2	1
SUM	17	12	9		12		10					14	13	10	9
AVG	2.8333	2	1.5		2		1.6666					2.3333	2.1666	1.6666	1.5

Course Code with Course Name: U23EET21-Electric Circuit Analysis

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C114.1	Explain circuit's behavior using circuit laws.
C114.2	Apply mesh analysis/ nodal analysis / network theorems to determine behavior of the given DC and AC circuit
C114.3	Compute the transient response of first order and second order systems to DC input
C114.4	Compute the transient response of first order and second order systems to AC input
C114.5	Compute power, line/ phase voltage and currents of the given three phase circuit
C114.6	Explain the behavior of magnetically coupled circuits.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2							2	1		2
CO2	3	3	2	3	2							2	1		2
CO3	3	3	2	2	2							2	2		1
CO4	3	3	2	2	2							2	2		1
CO5	3	3	2	2	2							2	2		1
CO6	3	3	2	2	2							2	1		2
SUM	18	18	12	12	12							12	9		9
AVG	3	3	2	2	2							2	1.5		1.5

Course Code with Course Name: U23EEP21-Electric Circuits Laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C115.1	Use simulation and experimental methods to verify the fundamental electrical laws for the given DC/AC circuit (Ex 1)
C115.2	Use simulation and experimental methods to verify the various electrical theorems for the given DC/AC circuit
C115.3	Analyze transient behavior of the given RL/RC circuit using simulation and experimental methods
C115.4	Analyze transient behavior of the given RLC circuit using simulation and experimental methods
C115.5	Analyze frequency response of the given series and parallel RLC circuit using simulation and experimentation methods
C115.6	Analyze the performance of the given three-phase circuit using simulation and experimental methods

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		2	1	1	2				2		2	1	2	1
CO2	3		2	1	2	2				2		2	1	2	1
CO3	3		2	1	2	2				2		2	1	2	2
CO4	3		1	2	1	1				2		3	1	2	2
CO5	3		1	2	1	1				2		2	1	2	2
CO6			2	2	1	2				2		2	1	2	1
SUM	15		10	9	8	10				12		12	6	12	9
AVG	3		1.6	1.5	1.3	1.6				2		2	1	2	1.5

Course Code with Course Name: U23HSP22-Communication Laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C116.1	Distinguish their technical competency through language skill.
C116.2	Predict context effectively in-group discussions held in a formal / semi-formal discussions.
C116.3	Understanding candidates' key characteristics.
C116.4	Finding personality traits by sharing and comparing thoughts and ability.
C116.5	Understanding the value of ethics.(rules and regulations).
C116.6	Construct emails and effective job applications.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									1	3		2			
CO2									1	2		2			
CO3									2	3		3			
CO4									2	3		2			
CO5									1	2		2			
CO6									3	3		2			
SUM									10	16		13			
AVG									1.6666	2.6666		2.1666			

Course Code with Course Name: U23GEP23-Problem solving and Python Programming Laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C117.1	Develop algorithmic solutions to simple computational problems
C117.2	Develop and execute simple Python programs.
C117.3	Implement programs in Python using conditionals and loops for solving problems.
C117.4	Deploy functions to decompose a Python program.
C117.5	Process compound data using Python data structures.
C117.6	Utilize Python packages in developing software applications.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	2	2	2				1	2		3		2	2
CO2		3	2	2	3				1	2		2		2	1
CO3		3	2	2	3				1	2		2		2	2
CO4		2	2	2	3				2	2		2		2	2
CO5		2	2	2	3				1	2		2		2	2
CO6		2	2	2	3				1	2		2		2	2
SUM		15	12	12	17				7	12		13		12	11
AVG		2.5	2	2	2.8333				1.1666	2		2.1666		2	2.16

III & IV SEMESTER

Course Code with Course Name: U23MAT31-Transforms and Partial Differential Equations

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C201.1	Understand how to solve the given standard partial differential equations.
C201.2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
C201.3	Appreciate the physical significance of Fourier series techniques in solving One and two dimensional heat flow problems and one-dimensional wave equations.
C201.4	Understand the mathematical principles on transforms would provide them the ability to formulate and solve some of the physical problems of engineering.
C201.5	Use the method of Laplace Transform to solve initial value problem for Linear
C201.6	Understand how to solve the given linear second order differential equations.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1								2	2		
CO2	2	1	1	1								2	2		
CO3	3	2	2	1								2	2		
CO4	3	1	1	1								2	2		
CO5	3	1	2	1								2	2		
CO6	2	1	2	1								2	2		
SUM	15	7	6	6								12	12		
AVG	2.5	1.1	1	1								2	2		

Course Code with Course Name: U23EET31-Measurements and instrumentation

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C202.1	Calibrate electrical parameter measuring instruments.
C202.2	Apply analog and digital techniques to measure electrical quantities.
C202.3	Measure resistance, inductance and capacitance using various bridge circuits.
C202.4	Measure Magnetic parameters and use various Electronics Instruments.
C202.5	Use various transducers for measuring non-electrical quantities.
C202.6	Identify various errors during measurement.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	3							2	1	2	1
CO2	3	2	3	2	2							2	1	2	1
CO3	3	3	2	1	3							2	1	2	1
CO4	3	3	2	2	3								1	2	1
CO5	3	2	3	2	3							3	1	2	1
CO6	3	2	3	2	3								1	2	1
SUM	18	14	16	11	17							9	6	12	6
AVG	3	2.3	2.6	1.8	2.8							2.2	1	2	1

Course Code with Course Name: U23EET32-Digital LogicCircuits

Course Code	Course Outcomes
	On Successful Completion of the Course,Students will be able to
C203.1	Interpret, convert and represent different number systems.
C203.2	Manipulate and examine Boolean algebra, logic operations, Boolean functions and their simplification.
C203.3	Design and analyze combinational and sequential logic circuits
C203.4	Design synchronous sequential logic circuits
C203.5	Analyze combinational and sequential circuits
C203.6	Design asynchronous sequential logic circuits

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	2				1			2	2	2	2
CO2	2	2	2	1	3				1			2	2	2	1
CO3	3	2	3	1	3				1			2	2	2	2
CO4	3	2	3	1	2				1			2	2	2	2
CO5	2	2	2	1	1				1			2	1	2	1
CO6	3	2	2	1	3				1			2	2	2	2
SUM	16	12	15	6	14				6			12	11	12	10
AVG	2.6	2	2.5	1	2.3				1			2	1.8	2	1.6

Course Code with Course Name: U23EET33-Electric and Magnetic Fields

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C204.1	Apply the basic mathematical concepts related to electromagnetic vector fields in field calculations.
C204.2	Apply the basic concepts about electrostatic fields for the calculation of electric field intensity, electrical potential and energy density.
C204.3	Explain Electric field in free space, conductors, dielectric and multiple dielectrics and apply the basic concepts in Capacitance calculations.
C204.4	Apply the basic concepts about magneto static fields for the calculation of magnetic flux density and scalar potential.
C204.5	Explain the different methods of emf generation and Maxwell's equations.
C204.6	Design asynchronous sequential logic circuits.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	1							2	2	1	2
CO2	2	2	3	3	2						1	2	2	1	2
CO3	2	2	3	2	2						1	2	1	1	2
CO4	2	2	3	2	2			-	-		1	2	2	1	2
CO5	2	2	2	2	2			-	-		2	1	2	1	2
CO6	2	1	1	1	1							2	2	1	2
SUM	12	10	13	9	8						5	11	11	6	12
AVG	2	1.6	2.16	1.5	2						1.25	1.8	1.8	1	2

Course Code with Course Name: U23EET34-Electronic Devices and Circuits

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C205.1	Demonstrate the construction, theory and characteristics of the basic electronic devices.
C205.2	Design a power supply, regulator and filter.
C205.3	Demonstrate the construction, operation and characteristics of BJT.
C205.4	Demonstrate the construction, operation and characteristics of FET devices .
C205.5	Identify and design a suitable amplifier/oscillator for a specific application.
C205.6	Explain concepts of special diodes

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1							2	2	2	2
CO2	3	2	1	1	1							2	2	2	2
CO3	3	1	2	1	2							2	2	2	2
CO4	3	1	1	1	1							2	2	2	2
CO5	3	2	3	1	2							2	2	2	2
CO6	3	1	2	1	2							2	2	2	2
SUM	18	8	10	6	9							12	12	12	12
AVG	3	1.3	1.6	1	1.5							2	2	2	2

Course Code With Course Name: U23EET35 - DC Machines and Transformers

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C206.1	Describe Energy Conversion of Electro Mechanical Devices
C206.2	Select DC Generator for a particular application based on its Characteristics.
C206.3	Select DC Motor for a particular application based on its Characteristics.
C206.4	Estimate Transformer parameters and its performance.
C206.5	Estimate machine parameters by conducting various tests.
C206.6	Understand parallel operation of DC Generators

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1							3	1	1	2
CO2	3	2	1	1	1	1						2	2	1	2
CO3	3	3	2	1	3	2						3	1	1	2
CO4	3	3	2	2		1						3	1	1	2
CO5	3	3	3	2	2	2						2	1	1	2
CO6	3	3	2			1						3	1	1	2
SUM	18	17	12	8	7	7						16	7	14	12
AVG	3	2.8	2	1.6	1.75	1.16						2.6	1.16	2.3	2

Course Code with Course Name: U23EEP31-Electronic Devices and Circuits Laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C207.1	Identify and select a suitable semiconductor device for a specific applications based on the characteristic
C207.2	Design and choose a suitable filter for various applications based on its filtering action.
C207.3	Design an amplifier using BJT
C207.4	Design a wave shaping circuit.
C207.5	Design an amplifier using JFET
C207.6	Design half wave and full wave rectifiers

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	1	1					1	1	1	
CO2	3	2	3	2	2							1	1	1	1
CO3	3	2	3	2	2							1	1	1	1
CO4	3	2	3	2	2							1	1	1	1
CO5	3	2	3	2	2							1	1	1	1
CO6	3	2	3	2	2							1	1	1	
SUM	18	12	17	11	12	1	1					6	6	6	4
AVG	3	2	2.833333	1.833333	2	1	1					1	1	1	1

Course Code with Course Name: U23EEP32-DC Machines and transformers Laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C208.1	Determine the performance characteristics of DC machines for different operating conditions
C208.2	Determine the performance characteristics and parameters of Transformers under different operating conditions
C208.3	Separate no load losses of Transformers
C208.4	Understand the performance characteristics of DC generator
C208.5	Understand the testing of single phase and three phase transformer
C208.6	Explain various D.C motor starters

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	1				1			2		1	2
CO2	3	3	2	1	1				1			2		1	2
CO3	3	3	2	1	1				1			2		1	2
CO4	3	3	2	1	1				1			2		1	2
CO5	3	3	2	1	1				1			2		1	2
CO6	3	3	2	1	1				1			2		1	2
SUM	18	18	12	6	6				6			12		6	12
AVG	3	3	2	1	1				1			2		1	2

Course Code with Course Name: U23EET41-Induction and Synchronous Machines

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C209.1	Determine regulation of both types of alternators
C209.2	Start synchronous motor and recommend for various specific applications
C209.3	Distinguish between types of Induction motors and select correctly the drive for applications
C209.4	Differentiate between different types of starting and speed control methods
C209.5	Select proper single phase motors for specific application requirements
C209.6	Describe the construction, principle of operation of special machines

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	3				2		1	2	3	3	1
CO2	3	3	2	3	3				2		1	2	3	3	1
CO3	3	3	2	3	3				2		1	2	3	3	1
CO4	3	3	2	3	3				2		1	2	3	3	1
CO5	3	3	2	3	3				2		1	2	3	3	1
CO6	3	3	1	1	2				2		1	2	2	1	1
SUM	18	18	11	16	17				12		6	12	17	16	6
AVG	3	3	1.8	2.6	2.8				2		1	2	2.8	2.6	1

Course Code with Course Name: UT3GET41-Environmental Science and Sustainability

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C210.1	Explain Environmental Pollution or problems cannot be solved by mere laws.
C210.2	Illustrate Public participation is an important aspect which serves the environmental Protection
C210.3	Obtain knowledge after completing the course.
C210.4	Explain Public awareness of environmental is at infant stage.
C210.5	Ignorance and incomplete knowledge has lead to misconceptions
C210.6	Development and improvement in std. of living has lead to serious environmental disasters

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2			2	3					2			
CO2	2	2	2			2	3					2			
CO3	2	1	3			2	3					2			
CO4	1	2	2			2	3					2			
CO5	2	1	2			2	3					2			
CO6	3	2	1			2	3					2			
SUM	12	10	12			12	12					12			
AVG	2	1.6	2			2	2					2			

Course Code with Course Name: U23EET42-Transmission and Distribution

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C211.1	Calculate the sag of transmission lines.
C211.2	Estimate the line parameters for transmission lines.
C211.3	Model the distribution system
C211.4	Predict the performance parameters of transmission lines
C211.5	Explain voltage distribution in insulator strings and Grading of cables
C211.6	Explain the types of Distribution System

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	2		2	1				3	2	3	3
CO2	3	2	2	3	2		2	1				3	3	2	3
CO3	3	2	2	3	2		2	1				3	3	2	3
CO4	3	2	2	3	2		2	1				3	3	2	3
CO5	3	2	3	3	2		2	1				3	3	2	3
CO6	3	2	3	3	2		2	1				3	3	2	3
SUM	18	12	14	18	12		12	6				18	17	13	18
AVG	3	2	2.6	3	2		2	1				3	2.8	2.1	3

Course Code with Course Name: U23CST35- C Programming and Data Structures

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C212.1	Develop C programs for any real world/technical application.
C212.2	Apply advanced features of C in solving problems.
C212.3	Write functions to implement linear and non-linear data structure operations.
C212.4	Suggest and use appropriate linear/non-linear data structure operations for solving a given problem.
C212.5	Appropriately use sort and search algorithms for a given application.
C212.6	Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			2	1	2							2	1	2	
CO2			2	1	2							2	1	2	
CO3			2	2	2							2	1	1	
CO4			2	2	2							2	1	1	
CO5			2	2	2							2	1	1	
CO6			2	1	2							2	1	2	
SUM			12	9	12							12	6	9	
AVG			2	1.5	2							2	1	1.5	

Course Code with Course Name: U23EET43-Linear Integrated Circuits and Applications

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C213.1	Describe the fabrication methods of op-amp.
C213.2	Describe the characteristics of op-amp.
C213.3	Design different applications using general purpose op- amp and application specific ICs
C213.4	Design circuits using Multipliers, and PLL
C213.5	Describe applications using Timer IC.
C213.6	Describe the application of ICs

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2		2							1	2	2	1
CO2	2	3	2		2							1	2	2	1
CO3	2	3	2		3							1	2	2	1
CO4	2	3	3		2							1	2	2	1
CO5	2	3	3		2							1	2	2	1
CO6	2	3	2		2							1	2	2	1
SUM	12	18	14		13							6	12	12	6
AVG	2	3	2.3		2.16							1	2	2	1

Course Code with Course Name: U23EET44-Analog and Digital Communication

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C214.1	Comprehend and appreciate the significance and role of this course in the present contemporary world
C214.2	Apply analog and digital communication techniques.
C214.3	Use data and pulse communication techniques.
C214.4	Apply Digital and Pulse Modulation techniques
C214.5	Analyze Source and Error control coding.
C214.6	Analyze different Multiple access methods

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2									3	2	2	
CO2	3	3	2									3	3	2	
CO3	3	3	2									3	3	2	
CO4	3	3	2									3	3	2	
CO5	3	3	2									3	3	2	
CO6	3	3	2									3	3	2	
SUM	18	18	12									18	18	12	
AVG	3	3	2									3	3	2	

Course Code with Course Name: UT23EEP41-Induction and Synchronous Machines Laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C215.1	Perform load test on generators & motors and to obtain performance characteristics.
C215.2	Perform load test on motors and to obtain performance characteristics.
C215.3	Apply various methods and techniques to determine regulation of alternators.
C215.4	Predetermine the performance characteristics of induction machines
C215.5	Determine the No-load losses of Induction Motor
C215.6	Apply the speed control techniques of BLDC Motor

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	2							2	2	1	1
CO2	3	2	2	2	2							2	2	1	1
CO3	3	2	3	3	2							2	2	1	1
CO4	3	3	3	2	2							2	3	1	1
CO5	3	3	3	2	2							2	3	1	1
CO6	3	3	3	2	2							2	2	1	1
SUM	18	16	16	14	12							12	14	6	6
AVG	3	2.6	2.6	2.3	2							2	2.3	1	1

Course Code with Course Name: UT23EEP42-Linear and Digital Circuits Laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C216.1	Realize and implement Boolean Functions.
C216.2	Perform code conversion and to understand its importance
C216.3	Design and implement circuits with digital ICs like decoders, multiplexers, register
C216.4	Acquire knowledge on Application of Op-Amp
C216.5	Design and implement counters using analog ICs like timers and VCOs
C216.6	Design and implement counters using digital ICs like Flip-flops and counters

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		2	2						2	2	2			3
CO2	3		2	2						2	2	3			3
CO3	3		2	2						2	3	3			3
CO4	3		2	2						2	2	2			3
CO5	3		2	2						2	3	2			3
CO6	3		2	2						2	3	2			3
SUM	18		12	12						12	15	14			18
AVG	3		2.6	2.6						2	2.5	2.3			3

Course Code with Course Name: U23CSP33-C Programming and Data Structures Laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C217.1	Use different constructs of C and develop applications
C217.2	Write functions to implement linear and non-linear data structure operations
C217.3	Suggest and use the appropriate linear / non-linear data structure operations for a given problem
C217.4	Apply appropriate hash functions that result in a collision free scenario for data storage and Retrieval
C217.5	Implement Sorting algorithms for a given application
C217.6	Implement searching algorithms for a given application

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			2	3	2							2	1	2	
CO2			2	2	2							2	1	2	
CO3			2	2	2							2	2	2	
CO4			2	3	2							2	2	2	
CO5			2	3	2							2	2	2	
CO6			2	3	2							2	1	2	
SUM			12	16	12							12	9	12	
AVG			2	2.6	2							2	1.5	2	

V & VI SEMESTER

Course Code with Course Name: U23EET51 - Control Systems

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C301.1	Develop mathematical models of electrical and mechanical systems.
C302.2	Estimate the time domain specifications.
C303.3	Estimate the frequency domain specifications.
C304.4	Analyze the performance and stability of system through time domain approach.
C305.5	Frame various types of state space model of a system.
C306.6	Analyze the stability of control systems using frequency response techniques such as Bode plot, Nyquist plot, and gain/phase margins.

CO-PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3			1				3	2	3	
CO2	3	3	3	3	3			1				3	2	3	
CO3	3	3	3	3	3			1				3	2	3	
CO4	3	3	3	3	3			1				3	2	3	
CO5	3	3	3	3	3			1				3	2	3	
CO6	3	3	3	3	3			1				3	2	3	
SUM	18	18	18	18	18			6				18	12	18	
AVG	3	3	3	3	3			1				3	2	3	

Course Code with Course Name: U23EET52 - Microprocessors and Microcontrollers

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C302.1	Develop programming of 8085 microprocessor based on its architecture.
C302.2	Design and Implement the Memory interface and interrupt with 8085 Processor
C302.3	Design and Implement the Peripheral Devices interface with 8085 Processor
C302.4	Develop programming of 8051 microcontroller based on its architecture
C302.5	Design and Implement the Memory & Peripheral Devices interface with 8051
C302.6	Understand and appreciate advanced architecture evolving microprocessor field

CO-PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		3		2			3			2	3	2	2	
CO2	2		2		2			2			2	3	2	2	
CO3	2		2		2			2			2	3	2	3	
CO4	2		3		2			3			2	3	2	2	
CO5	2		3		2			3			3	3	2	2	
CO6	2		2		2			3			3	3	2	2	
SUM	12		15		12			16			14	18	12	13	
AVG	2		2.5		2			2.6			2.3	3	2	2.16	

Course Code with Course Name: U23EET53 - Protection and Switchgear

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C303.1	Select proper earthing for the power system apparatus and components.
C303.2	Suggest the types of relays for specific applications
C303.3	Identify the protective schemes for safeguarding major power system apparatus and components
C303.4	Apply suitable methods for quenching arc
C303.5	Summarize the merits and application areas of various Protective transformers.
C303.6	Explain circuit breaker based on application requirements.

CO-PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	1	1	1	1	1	2	2	2	2	1
CO2	3	3	2	2	2	1	1	1	1	1	2	2	2	2	2
CO3	3	3	3	2	2	1	1	1	1	1	2	2	2	2	1
CO4	3	2	3	2	3	1	1	1	1	1	2	2	2	2	1
CO5	3	2	2	2	2	1	0	1	1	1	2	2	2	2	2
CO6	3	2	2	2	2	1	0	1	1	1	2	2	2	2	2
SUM	18	14	14	12	13	6	4	6	6	6	12	12	12	12	12
AVG	3	2.3	2.3	2	2.16	1	1	1	1	1	2	2	2	2	2

Course Code With Course Name: U23EET54 Principles of Digital Signal Processing

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C304.1	Apply the concepts of digital signal processing.
C304.2	Suggest the types of relays for specific applications
C304.3	Apply FFT algorithm for computing DFT of discrete signal.
C304.4	Design suitable digital FIR filter for the required specifications
C304.5	Design suitable digital IIR filter for the required specifications
C304.6	Apply DSP in power quality analysis.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	2	2	1		2					2	1	2	2
CO2	2	3	3	2	2		2					2	2	3	3
CO3	3	3	3	3	3		2					2	2	2	2
CO4	3	3	3	3	3		2					2	2	2	2
CO5	3	3	3	3	2		2					2	2	2	2
CO6	3	3	3	2	1		2					2	2	2	2
SUM	15	18	17	15	12		12					12	11	11	13
AVG	2.5	3	2.8333	2.5	2		2					2	1.8333	2.1666	2.1666

Course Code with Course Name: U23EEV15 – Power Plant Instrumentation and Control

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C305.1	Understand the basic principles of power generation
C305.2	Learn about measurement of various parameters in power plants
C305.3	Know the various analyzers in power plant
C305.4	Understand about the turbine boiler control
C305.5	Explain about the turbine monitoring
C305.6	Learn about air/fuel ration control in boilers

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3	2	1		2	2	2						3
CO2			2	2	1		2	2	2						3
CO3			2	2	2		2	1	3						3
CO4			2	2	2		2	1	3						2
CO5			2	2	1		2	2	2						2
CO6			2	2	1		2	2	2						2
SUM			13	12	8		12	10	14						15
AVG			2.6	2	1.3		2	1.6	2.6						2.5

Course Code with Course Name: U23RA012 – Elements of Industrial Automation System

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C306.1	Recognize the various concepts of fluid power and PLC systems
C306.2	Comprehend functions of fluid power and PLC systems
C306.3	Explain the various standard fluid power circuits, functions, communication and IO details of PLC
C306.4	Demonstrate the standard fluid power circuits and PLC based interfaces.
C306.5	Construct the fluid power circuits and PLC based automation system
C306.6	Demonstrate the Data Communication and Supervisory control system

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2					1	3	2	1	2	
CO2	2	2	1	2	3	1					2	2	1	2	
CO3	3	2	2	2	3					1	2	2	1	2	
CO4	3	2	3	2	3	1					2	2	1	2	
CO5	3	2	2	2	3	1				1	1	2	1	2	
CO6	3	3	2	2	3	1				1	2	2	1	2	
SUM	17	14	12	12	17	4				4	12	12	6	12	
AVG	2.8	2.6	2	2	2.5	1				1	2	2	1	2	

Course Code with Course Name: U23EEP51- Measurement and Control System Laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C307.1	Measure various electrical Parameters using various bridges.
C307.2	Familiar with calibration of energy meter and current transformer.
C307.3	Determine the transient response of simple electrical circuits.
C307.4	Model the transfer function of electromechanical systems.
C307.5	Determine the stability of linear systems.
C307.6	Determine the transfer function of various motors and generator.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	3	3	2	3			2	2		2			
CO2	2	1	3	2	2	3			2	3		2			
CO3	1	2	3	2	2	3			3	2		2			
CO4	2	2	3	2	2	3			3	2		2			
CO5	2	2	3	2	2	3			2	2		2			
CO6	2	1	3	2	2	2			2	2		2			
SUM	11	9	18	13	12	17			14	13		12			
AVG	1.8	1.5	3	2.16	2	2.8			2.3	2.16		2			

Course Code with Course Name: U23EEP52 - Microprocessors and Microcontrollers Laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C308.1	Develop skills in simple program writing in assembly languages.
C308.2	Develop programming of 8085 microprocessor based on its architecture and instruction set.
C308.3	Design and Implement the Peripheral Devices interface with 8085 Processor.
C308.4	Develop programming of 8051 microcontroller based on its architecture and instruction set.
C308.5	Design and Implement the Peripheral Devices interface with 8051 hardware components
C308.6	Ability to analyze, comprehend, design and simulate microcontroller and microprocessor based systems used for control and monitoring.

CO-PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		2	2						2	2	2	2		
CO2	3		2	3						2	3	2	2		
CO3	3		2	3						2	3	2	2		
CO4	3		2	2						2	3	2	2		
CO5	3		3	2						2	3	2	1		
CO6	3		3	2						2	3	2	1		
SUM	18		14	14						12	17	12	10		
AVG	3		2.3	2.3						2	2.8	2	1.6		

Course Code with Course Name: U23EET61 - Power Electronics

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C309.1	Identify and select the switching devices for different power converter applications.
C309.2	Design and analyze different DC-DC converter with various loads
C309.3	Design a suitable power converter for given dc load specification from AC input.
C309.4	Design and analyze the single phase inverter and three phase inverters.
C309.5	Explain the concepts of AC-AC converters.
C309.6	Design and analyze various pulse converters.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	3	2		3					2	3	2	2
CO2	2	2	3	3	2		2					2	3	2	2
CO3	2	2	3	3	2		2					2	3	2	2
CO4	2	2	3	3	2		2					2	3	2	2
CO5	2	2	1	3	2		2					2	2	1	2
CO6	2	2	3	3	2		2					2	3	2	2
SUM	12	12	16	18	12		12					12	17	11	12
AVG	2	2	2.6	3	2		2					2	2.8	1.8	2

Course Code with Course Name: U23EET62 - Embedded Systems

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C310.1	Operate various Embedded Development Strategies
C310.2	Suggest an embedded system for a given application
C310.3	Understand and analyze Embedded systems.
C310.4	Understand basics of Real time operating system
C310.5	Acquire knowledge on various processor scheduling algorithms
C310.6	Design memory and array structures.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2							3			1
CO2	3	3	3	2	2	1			1	2	2	2			1
CO3	3	2	3	2	3						2	2			
CO4	3	2	2	2	2							2			1
CO5	3	3	2	2	2							2			1
CO6	3	2	2	1	2	2	1		1	2	2	2			1
SUM	18	14	14	11	13	3	1		2	4	6	13			5
AVG	3	2.3	2.3	1.8	2.1	1.5	1		1	2	2	2.16			1

Course Code with Course Name: U23EET63 Power System Analysis

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C311.1	Do modelling for various power system components.
C311.2	Distinguish between different methods of power flow analysis.
C311.3	Design the protective gadgets based on short circuit capacity.
C311.4	Analyze the nature of the system for various fault conditions
C311.5	Identify the stability of Power system
C311.6	Analyze the equal area criterion by various methods

CO-PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2		2					3	2	3	3
CO2	3	3	2	2	2		2					3	2	3	3
CO3	3	3	2	3	2		2					3	2	2	3
CO4	3	3	3	3	2		2					3	2	3	3
CO5	3	3	3	2	2		2					3	2	2	3
CO6	3	3	3	3	2		2					3	2	2	3
SUM	18	18	15	15	12		12					18	12	15	18
AVG	3	3	2.5	2.5	2		2					3	2	2.5	3

Course Code with Course Name: U23EET64 - High Voltage Engineering

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C312.1	Ability to understand and analyze power system over voltage and protection.
C312.2	Understand breakdown mechanism in pure and commercial liquids.
C312.3	GenerateHVAC, HVDC and HV impulse voltages and currents.
C312.4	Measure HVAC, HVDC and HV impulse voltages and currents.
C312.5	Test high voltage electrical apparatus as per standards
C312.6	Understand the importance of insulation in electrical components

CO-PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	2		2					1	2	2	2
CO2	3	3	3	2	2		2					1	2	1	2
CO3	3	3	3	2	2		2					1	2	1	2
CO4	3	3	2	3	2		2					1	2	2	2
CO5	3	3	3	2	2		2					1	2	2	2
CO6	3	3	2	3	2		2					1	2	2	2
SUM	18	18	15	15	12		12					6	12	10	12
AVG	3	3	2.5	2.5	2		2					1	2	1.6	2

Course Code with Course Name: U23EEP61-Power Electronics and Drives Laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C315.1	Differentiate the characteristics of power Electronics switches.
C315.2	Design and analyze the single phase and three phase controlled rectifiers fed DC drives.
C315.3	Design and analyze the choppers and chopper fed dc drives.
C315.4	Analyze the inverter operation and inverter fed induction motor drives.
C315.5	Analyze the performance of AC-AC converters.
C315.6	Simulate the power converter topologies.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	2	2	1						2	2	1	3
CO2	3	3	3	2	3	1						2	2	1	3
CO3	3	3	3	2	3	1						2	2	1	3
CO4	2	3	3	2	3	1						2	2	1	3
CO5	2	3	3	2	3	1						2	2	1	3
CO6	2	2	2	3	3	1						2	2	1	3
SUM	14	17	16	13	17	6						12	12	6	18
AVG	2.3333	2.8333	2.6666	2.1666	2.8333	1						2	2	1	3

Course Code with Course Name: U23HS61-Comprehensive Skill Development

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C316.1	Enhance the employability skills.
C316.2	Prepare and present Technical Seminar effectively.
C316.3	Find out optimum solution for societal problem through group discussion.
C316.4	Succeed in competitive examination.
C316.5	Confidence to face the interview.
C316.6	Development in dress code and body language.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									1	3		2			
CO2									1	2		2			
CO3									2	3		3			
CO4									2	3		2			
CO5									1	2		2			
CO6									3	3		2			
SUM									10	16		13			
AVG									1.6666	2.6666		2.1666			

Course Code with Course Name: U23EEP62 - Mini-project

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C317.1	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.
C317.2	Develop project management skills for effective planning and execution.
C317.3	Collaborate in cross-functional teams to achieve project objectives.
C317.4	Apply critical thinking and problem-solving techniques to address project challenges.
C317.5	Foster creativity and innovation in project solutions and deliverables.
C317.6	Communicate project progress and outcomes through effective presentations and reports.

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	3			1	1	1	1	2	2	2	2
CO2	2	2	2	2	3	1		1	2	2	2	3	2	2	2
CO3	1	1	1		2	1		1	3	3	2	2	2	2	2
CO4	3	3	3	2	2			1	1	1	1	2	2	2	2
CO5	2	2	3	2	2		1	2	1	1	1	2	2	2	2
CO6	1	1	1		1	1		1	2	3	3	2	2	2	2
SUM	12	11	13	8	13	3	1	7	10	11	10	13	12	12	12
AVG	2	1.8	2.16	2	2.16	1	1	1.16	1.6	1.8	1.6	2.16	2	2	2

VII & VIII SEMESTER

Course Code with Course Name: U23EET71- Power System Operation and Control

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C401.1	Describe power system behavior, operations and control.
C402.2	Explain the modeling of Real Power and Frequency Control.
C403.3	Explain the analysis of Frequency Control.
C404.4	Explain the modeling and analysis of Reactive Power and Voltage Control
C405.5	Analyze the optimal dispatch problems and unit commitment in various power plants
C406.6	Describe the principles of computer control of power system

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	1	1				1	2	2	3	3
CO2	3	3	3	2	2	1	1				2	2	2	3	2
CO3	3	2	2	2	2	1	1				1	2	2	3	3
CO4	3	2	2	2	2	1	1				1	2	2	3	2
CO5	3	2	3	2	3	1	1		1	2	2	2	2	3	3
CO6	3	3	2	3	3	1	1				1	2	2	3	2
SUM	18	14	14	13	14	6	6		1	2	8	12	12	18	15
AVG	3	2.3	2.3	2.16	2.3	1	1		1	2	1.3	2	2	3	2.5

Course Code with Course Name: U23GET61- Human Values and Ethics

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C402.1	Understand definition and classification of values.
C402.2	Understand purusartha.
C402.3	Understand sarvodaya idea.
C402.4	Understand sustenance of life.
C402.5	Understand the hierarchy of values.
C402.6	Compare hierarchialviews of Pt. Madan Mohan Malviya and Mahatma Gandhi.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						3		3				2			
CO2						3		3				2			
CO3						3		3				2			
CO4						3		3				2			
CO5						3		3				2			
CO6						3		3				2			
SUM						18		18				12			
AVG						3		3				2			

Course Code with Course Name: U23EEP71-Power System Simulation laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C406.1	Develop C/C++ programs for power system.
C406.2	Use standard software packages for Power flow analysis, Fault analysis, Transient stability analysis and Load-Frequency Dynamics and control of power
C406.3	Evaluate performance evaluation of transmission lines
C406.4	To understand formation of bus admittance and impedance matrices
C406.5	Solving Economic Dispatch problems and for performing state estimation.
C406.6	Analyzing Electromagnetic Transients in Power Systems.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2								2	2	3
CO2	3	3	2	2	2								2	2	3
CO3	3	3	3	2	2								2	2	3
CO4	3	2	3	2	3								2	2	3
CO5	3	2	2	2	2								2	2	3
CO6	3	2	2	2	2								2	2	3
SUM	18	14	14	12	13								12	12	18
AVG	3	2.3	2.3	2	2.16								2	2	3

Course Code with Course Name: U23EEP72-Electrical Design and Green Energy laboratory

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C407.1	Explain the practical issues related to applications using electrical and electronic equipment.
C407.2	Address variety of issues in harnessing Renewable Energy.
C407.3	Explain future role of Renewable energy sources in meeting global power demand.
C407.4	Explain fuel cell formation.
C407.5	Evaluate Performance assessment of Grid connected and Standalone 1kW Solar PV system.
C407.6	Evaluate on Performance Assessment of Hybrid (Solar – Wind) Power System.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	3	3	1				2	2	3	3
CO2	3	3	2	2	2	3	3					2	2	3	3
CO3	2	2	1	1	1	2	3					2	2	3	3
CO4	3	2	2	2	2	2	2					2	2	3	3
CO5	3	2	2	2	2	2	3					2	2	3	3
CO6	3	2	2	2	3	2	2					2	2	3	3
SUM	17	13	11	10	12	14	16	1				12	12	18	18
AVG	2.8	2.16	1.8	1.6	2	2.3	2.7	1				2	2	3	3

Course Code with Course Name: U23EEP81-ProjectWork

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
C410.1	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.
C410.2	Develop project management skills for effective planning and execution.
C410.3	Collaborate in cross-functional teams to achieve project objectives.
C410.4	Apply critical thinking and problem-solving techniques to address project challenges.
C410.5	Foster creativity and innovation in project solutions and deliverables.
C410.6	Communicate project progress and outcomes through effective presentations and reports.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	2	1	1	1	1	2	2	2	3	2	3	3
CO2	3	3	2	2	2	1	1	1	1	1	2	3	2	3	3
CO3	3	2	3	2	2	2	2	1	2	2	2	3	2	3	3
CO4	2	2	3	1	2	2	2	1	2	2	2	3	2	3	3
CO5	2	2	2	3	3	1	1	1	1	1	2	3	2	3	3
CO6	2	3	2	3	2	2	3	1	2	2	2	3	2	3	3
SUM	14	15	14	13	12	9	10	6	10	10	12	18	12	18	18
AVG	2.3	2.5	2.3	2.16	2	1.5	1.6	1	1.6	1.6	2	3	2	3	3

VERTICALS I ENERGY AND POWER SYSTEMS**Course Code with Course Name: U23EEV11 Power Quality and Flexible AC Transmission Systems**

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Use various definitions of power quality for power quality issues
CO2	Describe the concepts related with single phase / three phase
CO3	Solve problems related with mitigation of Power System Harmonics
CO4	Use DSTATCOM for load compensation
CO5	Demonstrate the role of DVR, SAFs UPQC in power distribution systems .
CO6	Describe the concepts related with linear/nonlinear loads and single phase/three phase

CO-PO MAPPING

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	1	2	2	1	2	1	2	2	2	2
CO2	3	2	2	2	2	1	1	1	1	2	1	2	2	2	2
CO3	3	3	3	3	3	1	2	2	1	2	1	3	2	2	2

CO4	3	3	3	3	3	1	2	2	1	2	1	3	2	2	2
CO5	3	3	3	3	3	1	2	2	1	2	1	3	2	2	2
CO6	3	2	2	2	2	1	1	1	1	2	1	2	2	2	2
SUM	18	15	15	15	15	6	10	10	6	12	6	15	12	12	12
AVG	3	2.5	2.5	2.5	2.5	1	1.6666	1.6666	1	2	1	2.5	2	2	2

Course Code With Course Name: U23EEV12 Restructured Power Systems

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Explain the key issues in electric utilities restructuring
CO2	discuss the concept of electric utility markets in the united states & outside the united states
CO3	discuss the concept of open access same-time information system
CO4	describe the concept of Electricity Pricing
CO5	describe the concept of Electric Energy trading
CO6	Discuss the factors about electric energy trading

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	2	2	1	2	1	3	2	2	1
CO2	3	2	2	2	2	2	2	2	1	2	1	3	2	2	1
CO3	3	3	2	2	3	1	2	1	1	2	2	3	2	2	1
CO4	3	3	3	3	2	1	2	1	1	2	1	3	2	2	1
CO5	3	3	3	3	2	1	2	1	1	2	1	3	2	2	1
CO6	3	2	3	2	2	1	2	1	1	2	1	3	2	2	1
SUM	18	15	15	15	13	8	12	8	6	12	7	18	12	12	6
AVG	3	2.5	2.5	2.3333	2.1666	1.3333	2	1.3333	1	2	1.1666	3	2	2	1

Course Code with Course Name: U23EEV13 Energy Management and Auditing

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Students able to acquire knowledge in the field of energy management and auditing process.
CO2	Learned the about basic concepts of economic analysis and load management.

CO3	Able to design the effective thermal utility system.
CO4	Able to improve the efficiency in compressed air system.
CO5	Acquired the design concepts in the field of lighting systems.
CO6	Acquired the design concepts in the field of light sources and various forms of cogeneration.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	3	2	1	2	1	3		1	1
CO2	3	3	2	2	2	2	2	2	1	2	1	3		1	1
CO3	3	2	3	3	3	2	2	1	1	2	2	3		1	1
CO4	3	2	3	3	3	2	2	1	1	2	2	3		1	1
CO5	3	2	3	2	3	2	2	1	1	2	2	3		1	1
CO6	3	2	3	3	3	2	3	2	1	2	2	3		1	1
SUM	18	13	16	15	16	12	14	9	6	12	10	18		6	6
AVG	3	2.1666	2.6666	2.5	2.6666	2	2.3333	1.5	1	2	1.6666	3		1	1

Course Code With Course Name: U23EEV14 Electrical Energy Utilization and Conservation

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Ability to choose suitable electric drives for different applications

CO2	Ability to design the illumination systems for energy saving
CO3	Ability to demonstrate the utilization of electrical energy for heating and welding purposes
CO4	Ability to know the effective usage of solar and wind energies for electrical applications
CO5	Ability to do electric connection for any domestic appliances
CO6	Ability to know earthlings system for domestic purpose.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	1	2	1	1	2	1	2	1	2	1
CO2	3	2	3	2	2	1	3	2	1	2	1	3	1	2	1
CO3	3	2	2	2	2	1	2	1	1	2	1	2	1	2	1
CO4	3	2	2	2	2	1	3	2	1	2	1	3	1	2	1
CO5	3	2	2	2	2	1	2	1	1	2	1	2	1	2	1
CO6	3	2	2	2	2	1	2	1	1	2	1	2	1	2	1
SUM	18	13	14	12	13	6	14	8	6	12	6	14	6	12	6
AVG	3	2.1666	2.3333	2	2.1666	1	2.3333	1.3333	1	2	1	2.3333	1	2	1

Course Code with Course Name: U23EEV15 Power Plant Instrumentation and Control

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Understand the basic principles of power generation.
CO2	Learn about measurement of various parameters in power plant.
CO3	Know the various analyzers in power plant.
CO4	Understand about the turbine boiler control.
CO5	Explain about the turbine monitoring.
CO6	Learn about air/fuel ratio control in boilers.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	2	2			1		2	1	2	2
CO2	3	2	2	2	3	1	1			1		2	1	2	2
CO3	2	2	2	2	3	1	1			1		2	1	2	2
CO4	3	2	2	3	3	1	1			1		2	1	2	2
CO5	3	1	2	3	3	1	1			1		2	1	2	2
CO6	3	2	1	3	3	2	2			1		2	1	2	2
SUM	17	11	10	14	16	8	8			6		12	6	12	12
AVG	2.8333	1.8333	1.6666	2.3	2.6	1.3	1.3			1		2	1	2	2

Course Code With Course Name: U23EEV16 Micro grids

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Relate the conventional power generation and distributed generation
CO2	Explain the grid integration system with conventional and non-conventional energy sources
CO3	Explain the grid integration system with conventional and non-conventional energy sources
CO4	Explicate the concept of AC/DC micro grids
CO5	Analyze power quality issues and control operation of micro grid
CO6	Analyze the passive and active based techniques

CO-PO MAPPING

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	2	3		0	1	1	2	1	1	1

CO2	3	3	3	2	2	2	3		1	1	1	2	1	1	1
CO3	3	3	2	2	3	1	2		1	1	1	2	1	1	1
CO4	3	3	3	3	3	1	2		1	1	1	2	1	1	1
CO5	3	3	3	3	3	1	1		0	1	1	2	1	1	1
CO6	3	3	3	3	2	1	1		0	1	1	2	6	6	6
SUM	18	17	16	14	15	8	12		3	6	6	12	1	1	1
AVG	3	2.8	2.6	2.3	2.5	1.3	2		1	1	1	2	1	1	1

VERTICALS II EMBEDDED AND AUTOMATION CONTROL

Course Code With Course Name: U23EEV21 Embedded System Design

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	The hardware functional and software strategies required to develop various Embedded systems
CO2	The basic differences between various Bus communication standards
CO3	The incorporation of the interface as Interrupt services
CO4	The various scheduling algorithms through a Real-time operating system.

CO5	The various embedded concepts for developing automation applications.
CO6	The basic function of synchronization using semaphores.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2			2					2			3	2	2
CO2	2	2			3					1			2	1	2
CO3	3		2		2					2			3	2	2
CO4	3	2	2	2	2					1			2	2	1
CO5	2	2	2	2	2					2			3	3	1
CO6	3	2	2		2					1			2	2	1
SUM	16	10	8	4	13					9			15	12	9
AVG	2.6666	2	2	2	2.1666					1.5			2.5	2	1.5

Course Code With Course Name: U23EEV22 Smart System Automation

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to

CO1	Understand the concepts of smart system design and its present developments.
CO2	Illustrate different embedded open-source and cost-effective techniques for developing.
CO3	Acquire knowledge on different platforms and Infrastructure for Smart system design.
CO4	Infer about smart appliances and energy management concepts.
CO5	Improve Employability and entrepreneurship capacity due to knowledge up gradation on embedded system technologies.
CO6	Develop the mobile robot design.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2			2					2			3	2	2
CO2	2	2	2		3					1			3	2	2
CO3	3	2	3		2					2			3	3	2
CO4	3	2	2	2	2	1				1			2	3	2
CO5	2	2			2				2	3	2	2	2	2	3
CO6	3	2	3		3					2	1	2	3	3	2
SUM	16	12	10	2	14	1			2	11	3	4	16	15	13
AVG	2.6666	2	1.6666	2	2.3333	1			2	1.8333	1.5	2	2.6666	2.5	2.1666

Course Code With Course Name: U23EEV23 MEMS and NEMS

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Explain the material properties and the significance of MEMS and NEMS for industrial automation.
CO2	Demonstrate knowledge delivery on micromachining and micro fabrication.
CO3	Apply the fabrication mechanism for MEMS sensor and actuators.
CO4	Apply the concepts of MEMS and NEMS to models, simulate and process the sensors and actuators.
CO5	Improved Employability and entrepreneurship capacity due to knowledge up gradation on MEMS and NEMS technology.
CO6	Developments in recent trends in MEMS.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2			2					2			3	2	2
CO2	3	2			3					2			3	2	1
CO3	3	2	2		3					2			3	3	2
CO4	3	3	3	2	2					2			3	3	1

CO5	2	2	3		2				2	3	2	2	2	2	2
CO6	2				1					2	1	2	2	1	3
SUM	16	11	8	2	13				2	13	3	4	16	13	11
AVG	2.6666	2.2	2.6666	2	2.1666				2	2.1666	1.5	2	2.6666	2.1666	2.2

Course Code With Course Name: U23ECO13 VLSI Design

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Develop CMOS design techniques
CO2	Learn and build IC fabrication
CO3	Explain the need of reconfigurable computing with PLDs.
CO4	Design and development of reprogrammable FPGA.
CO5	Illustrate and develop HDL computational processes with improved design strategies.
CO6	Learn about shift registers.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2		2					1			3	2	1
CO2	3	2			2					1			2	1	1
CO3	2	2	2		3					2			3	2	2
CO4	3	2	3		3					2			3	3	2
CO5	3	2	3		3					2		1	3	3	1
CO6	2		2		2					1			2	2	1
SUM	16	10	12		15					9		1	16	13	8
AVG	2.6666	2	2.4		2.5					1.5		1	2.6666	2.1666	1.3333

Course Code With Course Name: U23EEV25 Embedded Control for Electric Drives

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Interpret the significance of embedded control of electrical drives
CO2	Deliver insight into various control strategies for electrical drives.
CO3	Developing knowledge of Machine learning and optimization techniques for motor control.

CO4	Develop embedded system solutions for real-time application such as Electric vehicles and UAVs
CO5	Improved Employability and entrepreneurship capacity due to knowledge up gradation on recent trends in embedded system skills required for motor control strategy
CO6	Develop embedded based motor speed control.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2			2					2			3	2	2
CO2	3	2	3		2					2			3	3	2
CO3	3	3	3	2	3					2			3	3	2
CO4	3	2	3	3	3					2			3	3	3
CO5	2	2			2				2	3	2	2	2	2	3
CO6	3	2	3	2	3					2	1		3	3	3
SUM	17	13	12	7	15				2	13	3	2	17	16	15
AVG	2.8333	2.1666	3	2.3333	2.5				2	2.1666	1.5	2	2.8333	2.6666	2.5

Course Code With Course Name: U23EEV26 SCADA and Distributed Control Systems

Course Code	Course Outcomes
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	On Successful Completion of the Course, Students will be able to
CO1	Interface DCS system in different architecture.
CO2	Interface DCS system in different standards
CO3	Interface the digital controllers with PC.
CO4	Identify required architectural interface for the industrial process.
CO5	Develop simple proto type applications.
CO6	Develop the water treatment plant.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2		2					2			3	2	2
CO2	3	2			2					1			2	2	1
CO3	2	2	3		2					2			3	3	2
CO4	3	2	2	2	2					2			3	3	3
CO5	2	2	3	2	2				2	2		2	3	3	3
CO6	3	2	3	2	3					2		2	3	3	2
SUM	16	12	13	6	13				2	11		4	17	16	13
AVG	2.6666	2	2.6	2	2.1666				2	1.8333		2	2.8333	2.6666	2.6

VERTICALS III ELECTRIC VEHICLE TECHNOLOGY

Course Code With Course Name: U23EEV31 Electric Vehicle Architecture

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Summarize the History and Evolution of EVs, Hybrid and Plug-In Hybrid EVs
CO2	Describe the various EV components
CO3	Describe the concepts related in the Plug-In Hybrid Electric Vehicles
CO4	Analyze the details and Specifications for the various EVs developed
CO5	Describe the hybrid vehicle control strategy
CO6	Analyze the power components and brakes

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2				1					1			2	1	2

CO2	3	2	2		2					2			3	2	2
CO3	3	2	2		2					2			3	2	1
CO4	3	2	3	2	3					2			3	3	1
CO5	2	2	3		3					2		1	3	3	2
CO6	3	2	2	2	3					2		1	3	3	3
SUM	16	10	12	4	14					11		2	17	14	11
AVG	2.6666	2	2.4	2	2.3333					1.8333		1	2.8333	2.3333	1.8333

Course Code With Course Name: U23EEV32 Design of Motor and Power Converters for Electric Vehicles

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	To use appropriate electric machine for electric vehicle application
CO2	To compute transfer function with factors such as constant, integral, differential, first order factor and second order factor (both numerators & denominators)
CO3	To compute transfer function from state models.
CO4	To design buck, boost and buck-boost converter.
CO5	To compute a power stage transfer functions for DC-DC converters.
CO6	Analyze the various power stage transfer functions

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2		2					2			3	3	3
CO2	3	2	3	2	2					1			3	2	2
CO3	3	2	3	2	2					1			3	2	3
CO4	3	2	3	2	3					2			3	3	2
CO5	3	2	3	2	3					2			3	3	3
CO6	3	2	3	2	2					2			3	3	2
SUM	18	12	17	10	14					10			18	16	15
AVG	3	2	2.8333	2	2.3333					1.6666			3	2.6666	2.5

Course Code With Course Name: U23EEV33 Intelligent Control of Electric Vehicles

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	To design the mathematical model of a BLDC motor and to discuss about its characteristics.
CO2	To demonstrate the PID control, ant windup controller, Intelligent Controller
CO3	To illustrate the basics of fuzzy logic system168.

CO4	To describe the basics of VHDL & FPGA applied to control of EVs.
CO5	To design and implement of fuzzy logic control scheme for BLDC motor using FPGA in real Time.
CO6	To demonstrate theVector Control. Control applied to BLDC motor.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	2					1			3	3	2
CO2	3	2	3	2	2					2		1	3	3	2
CO3	2	2	2		2					2			2	2	2
CO4	3	2	3	2	3					2		1	3	3	3
CO5	3	2	3	2	3					2		2	3	3	3
CO6	3	2	3	2	3					2		1	3	3	2
SUM	17	12	17	10	15					11		5	17	17	14
AVG	2.8333	2	2.8333	1.6666	2.5					1.8333		1.25	2.8333	2.8333	2.3333

Course Code With Course Name: U23EEV34 Grid Integration of Electric Vehicles

Course Code	Course Outcomes
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	On Successful Completion of the Course, Students will be able to
CO1	Explain the concepts related with V2G.
CO2	Study the grid connection of 3 phase Q inverter.
CO3	Explain the technical, economics. Business, regulatory
CO4	Demonstrate the impact of EV and V2G on smart grid and renewable energy system.
CO5	Explain the concept of grid integration and management of Evs.
CO6	Explain the political challenges related with V2G.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2		2	2	2	1	1	2	1	1	3	2	1
CO2	3	2	3	2	3		1			1	1	1	3	3	2
CO3	2	2			2	3	2	2	1	2	2	1	2	2	2
CO4	3	2	2	2	3	3	3	2	1	3	2	2	3	3	3
CO5	3	2	3	2	3	2	3	1	2	2	2	2	3	3	2
CO6	2	1			2	3	3	3	1	2	2	2	2	2	1
SUM	16	11	10	6	15	13	14	9	6	12	10	9	16	15	11
AVG	2.6666	1.8333	2.5	2	2.5	2.6	2.3333	1.8	1.2	2	1.6666	1.5	2.6666	2.5	1.8333

Course Code With Course Name: U23EEV35 Design of Electric Vehicle Charging System

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	To illustrate various charging techniques and to know charging standards and regulations.
CO2	To demonstrate the working o DC-DC converters used for charging systems and principles
CO3	To illustrate the advantages of renewable system based charging systems
CO4	To demonstrate the principles of wireless power transfer.
CO5	To analyze the standards for wireless charging
CO6	Explain the power factor correction in charging system

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	3	2	1	1	2	1	1	3	2	1
CO2	3	3	3	2	2	2	1		1	1	1	1	3	3	2
CO3	2	2	2	2	2	3	3	2	1	2	2	2	3	2	2

CO4	3	2	3	2	3	2	2	1	1	2	1	2	3	3	2
CO5	2	2	2	3	2	3	2	2	1	2	2	2	2	2	2
CO6	3	2	3	2	2	2	1	1	1	2	1	2	3	3	2
SUM	16	13	15	13	13	15	11	7	6	11	8	10	17	15	11
AVG	2.6666	2.1666	2.5	2.1666	2.1666	2.5	1.8333	1.4	1	1.8333	1.3333	1.6666	2.8333	2.5	1.8333

Course Code With Course Name: U23EEV36 Electric Vehicle Design, Mechanics and Control

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	To describe the concepts related with EV, HEV and to compare the same with internal combustion engine vehicles
CO2	To find gain margin & phase margin for various types of transfer functions of boost converter
CO3	To demonstrate the Control of A C Machines.
CO4	To explain the concepts related with batteries and parameters of battery
CO5	To module the battery and to study the research and development for batteries
CO6	To understand concept of electric Vehicle

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	2	2	1	1	2	1	1	3	2	1
CO2	3	3	3	2	2	1	1			1	1	1	3	3	2
CO3	3	3	3	2	3	2	2	1	1	2	2	2	3	3	2
CO4	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2
CO5	2	3	2	3	2	3	2	2	2	2	2	2	3	2	3
CO6	3	2	2	1	2	2	2	1	1	2	1	1	3	2	1
SUM	16	15	14	11	13	12	11	6	6	11	9	9	17	14	11
AVG	2.6666	2.5	2.3333	1.8333	2.1666	2	1.8333	1.2	1.5	1.8333	1.5	1.5	2.8333	2.3333	1.8333

VERTICALS IV GENERAL

Course Code With Course Name: U23AIT41 Artificial Intelligence for Engineers

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Represent problems in symbolic logic

CO2	Use the knowledge and the process of inference to derive new facts
CO3	Formulate a problem and find the solution using search techniques and probabilistic methods
CO4	Build AI system using AI technologies and expert system.
CO5	Design machine learning model for real world problems
CO6	Explain the basic concepts of neural network

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	1	1	1	1	1	1	1	3	2	1
CO2	3	3	3	3	2	2	1	1	1	2	1	1	3	2	2
CO3	3	3	3	3	3	2	2	1	2	2	2	2	3	3	2
CO4	3	2	3	3	3	2	2		2	2	2	2	3	3	3
CO5	3	3	3	3	3	2	2	2	2	2	2	2	3	3	3
CO6	2	2	2	2	2	1	1	1	1	1	1	1	2	2	2
SUM	17	15	16	16	15	10	9	6	9	10	9	9	17	15	13
AVG	2.8333	2.5	2.6666	2.6666	2.5	1.6666	1.5	1.2	1.5	1.6666	1.5	1.5	2.8333	2.5	2.1666

Course Code With Course Name: U23EEV42 Data Science for Engineers

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Identify phases involved in the life cycle of Data Science
CO2	Pre-process the data manipulation in Python and manage the data for efficient storage
CO3	Realize the various data analytics techniques for modelling/columnar Data using Python Pandas
CO4	Explore a flexible range of data visualizations approaches in Python.
CO5	Analyse various Machine learning algorithms for data modelling with Python
CO6	Apply data science concepts to solve real-world engineering problems using appropriate tools and techniques.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	1	1	1	1	1	1	1	2	2	1
CO2	3	3	2	2	2	2	1	1	1	2	1	1	3	2	2
CO3	3	3	3	2	2	2	1	1	1	2	1	2	3	3	2
CO4	2	2	2	2	2	2	1	1	1	2	2	2	2	2	2
CO5	3	3	3	3	2	2	2	2	2	2	2	2	3	3	3
CO6	3	3	3	3	3	3	2	2	2	2	2	3	3	3	3
SUM	18	16	15	13	12	12	8	8	8	11	9	11	16	15	13
AVG	3	2.6666	2.5	2.1666	2	2	1.3333	1.3333	1.3333	1.8333	1.5	1.8333	2.6666	2.5	2.1666

Course Code With Course Name: U23ECT43 Digital Signal Processing

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Apply DFT for the analysis of digital signals and systems
CO2	Design IIR and FIR filters
CO3	Characterize the effects of finite precision representation on digital filters
CO4	Design multirate filters
CO5	Apply adaptive filters appropriately in communication systems
CO6	Design floating point architecture

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	1	1	1	1	1	1	1	1	3	2	1
CO2	3	3	3	2	2	2	1	1	1	2	1	1	3	3	2

CO3	3	3	2	2	2	2	1	1	1	1	1	1	3	2	2
CO4	3	2	3	2	2	2	1	1	1	2	1	2	3	2	2
CO5	2	2	3	2	3	2	2	2	2	2	2	2	3	3	2
CO6	3	2	2	2	2	2	2	1	1	2	1	2	3	2	3
SUM	17	14	15	12	12	11	8	7	7	10	9	9	18	14	12
AVG	2.8333	2.3333	2.5	2	2	1.8333	1.3333	1.1666	1.1666	1.6666	1.5	1.5	3	2.3333	2

Course Code With Course Name: U23EEV44 Fundamentals of Robotics

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Understand the fundamentals of robotics.
CO2	Explain about rigid body transformations.
CO3	Describe the forward and inverse kinematics
CO4	Explain about various actuators
CO5	Explain about various robotic sensors

CO6	Illustrate end effector motion with an example
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CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	1	1	1	1	1	1	1	2	2	3
CO2	3	2	2	2	1	1	1	1	1	1	1	1	2	2	2
CO3	3	3	3	2	2	1	1	1	1	2	1	1	3	2	2
CO4	2	2	2	1	2	1	1	1	1	1	1	1	2	2	2
CO5	2	2	2	1	2	1	2	1	1	1	1	1	2	2	2
CO6	3	2	3	2	2	2	2	1	1	2	1	2	3	1	2
SUM	16	13	14	9	10	7	8	6	6	8	6	7	14	11	13
AVG	2.6666	2.1666	2.3333	1.5	1.6666	1.1666	1.3333	1	1	1.3333	1	1.1666	2.3333	1.8333	2.1666

Course Code With Course Name: U23BMT41 BIOMEDICAL INSTRUMENTATION

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Understand the physiology of the heart, lung, blood circulations and respirations
CO2	Know the usage of latest medical equipment available for measurement of non-electrical parameters in the physiological systems of the human body.
CO3	Obtain the in-depth knowledge in various electrical origins of recording methods of ECG, EEG, EMG and ERG

CO4	Know the latest procedure adopted for providing Medical assistance through telemetry
CO5	Know the latest procedure adopted for Therapeutic equipment used for diagnostic and surgery purposes.
CO6	Aware of modern methods of imaging techniques used for diagnostic purpose in the health care centre.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	1	2	1	1	1	1	1	2	2	1
CO2	3	2	3	2	2	1	2	1	1	2	1	1	3	3	2
CO3	3	3	3	2	2	1	2	1	1	2	1	1	3	3	2
CO4	2	2	2	2	2	2	2	1	1	2	2	2	3	2	2
CO5	2	2	2	2	2	2	2	1	1	2	1	2	3	2	2
CO6	2	2	3	2	2	2	3	1	1	2	1	2	3	3	2
SUM	15	13	15	11	11	9	13	6	6	11	7	9	17	15	11
AVG	2.5	2.1666	2.5	1.8333	1.8333	1.5	2.1666	1	1	1.8333	1.1666	1.5	2.8333	2.5	1.8333

Course Code With Course Name: U23EEV46 Advanced Microprocessor and Microcontrollers

Course Code	Course Outcomes
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	On Successful Completion of the Course, Students will be able to
CO1	Understand the architecture and interrupt structure of 8086 microprocessor.
CO2	Understand the architecture of 80186, 80286, 80386, 80486 and Pentium microprocessor
CO3	Develop programs based on the architecture and instruction set of PIC 18 series microcontroller
CO4	Design interfacing applications based on internal peripheral units of PIC 18 microcontrollers and programming them
CO5	Understand interfacing of microprocessor for various applications
CO6	Understand the instruction set of 80186, 80286, 80386, 80486 and Pentium microprocessor

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	1	1	1	1	1	1	1	1	3	2	1
CO2	3	2	2	2	1	1	1	1	1	1	1	1	2	2	1
CO3	3	3	3	3	2	1	1	1	1	2	1	2	3	3	2
CO4	3	3	3	3	3	2	2	1	2	2	2	2	3	3	3
CO5	3	2	3	2	3	2	2	1	2	2	2	2	3	3	2
CO6	3	2	2	2	1	1	1	1	1	1	1	1	2	2	1
SUM	18	14	15	14	11	8	8	6	8	9	8	9	16	15	10
AVG	3	2.3333	2.5	2.3333	1.8333	1.3333	1.3333	1	1.3333	1.5	1.3333	1.5	2.6666	2.5	1.6666

VERTICALS V CONVERTERS AND DRIVES

Course Code With Course Name: U23EEV51 Multilevel Power Converters

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Examine the different topologies of multilevel inverters (MLIs) with and without DC link capacitor.
CO2	Examine the performance of MLIs with Bipolar Pulse Width Modulation (PWM) Unipolar PWM Carrier-Based PWM Schemes Phase Level Shifted Multicarrier Modulation.
CO3	Demonstrate the working principles of Cascaded H-Bridge MLI, diode clamped MLI, flying capacitor MLI and MLI with reduced switch count
CO4	Analyze the voltage balancing performance in Diode clamped MLI
CO5	Simulate three level, capacitor clamed and diode clamped MLI with R and RL load.
CO6	Design and implement multi-level converters to real time application

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	1	1	1	1	1	1	1	1	3	2	1

CO2	3	3	2	2	2	1	1	1	1	1	1	1	1	3	2	2
CO3	3	3	3	2	2	1	1	1	1	2	1	1	3	3	3	2
CO4	3	2	3	3	2	1	1	1	1	2	1	2	3	3	3	2
CO5	3	2	3	2	2	2	1	1	1	2	1	2	3	3	3	2
CO6	3	3	3	3	3	2	2	2	2	2	2	3	3	3	3	3
SUM	18	15	16	14	12	8	7	7	7	10	7	10	18	16	16	12
AVG	3	2.5	2.6666	2.3333	2	1.3333	1.1666	1.1666	1.1666	1.6666	1.1666	1.6666	3	2.6666	2	2

Course Code With Course Name: U23EEV52 Power Electronics for Renewable Energy Systems

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Examine the available renewable energy sources
CO2	Demonstrate the working principles of electrical machines and power converters used for wind energy conversion system
CO3	Demonstrate the principles of power converters used for solar PV systems
CO4	Examine the available hybrid renewable energy systems
CO5	Simulate AC-DC converters, buck/boost converters, AC-AC converters and PWM inverters.
CO6	Design and implement power converters to real time application

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	1	1	2	1	1	1	1	1	3	2	1
CO2	3	2	3	2	2	2	2	1	1	2	1	2	3	3	2
CO3	3	2	3	2	2	2	2	1	1	2	1	2	3	3	2
CO4	3	2	2	2	1	2	2	1	1	1	1	1	3	2	2
CO5	3	3	3	2	3	2	2	1	1	2	1	2	3	3	2
CO6	3	3	3	3	3	2	2	2	2	2	2	3	3	3	3
SUM	18	14	16	13	12	11	12	7	7	10	7	11	18	16	12
AVG	3	2.3333	2.6666	2.1666	2	1.8333	2	1.1666	1.1666	1.6666	1.1666	1.8333	3	2.6666	2

Course Code With Course Name: U23EEV53 Control of Power Electronics Circuits

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	To calculate transfer function for constant, differential, integral, First order and Second order factors
CO2	To illustrate the effect of poles and zero's in the 's' plane.
CO3	To select Symbolic equations for solving problems related with Matrices, Polynomial and vectors.
CO4	To compute the control expression for DC – DC buck converter using sliding mode control theory.

CO5	To determine the controller expression for power factor correction circuits
CO6	Design and implement power controllers

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	1	1	1	1	1	1	1	2	2	1
CO2	3	2	2	2	1	1	1	1	1	1	1	1	2	2	1
CO3	3	3	2	2	2	1	1	1	1	1	1	1	3	2	2
CO4	3	2	3	3	2	1	1	1	1	2	1	2	3	3	2
CO5	3	2	3	3	2	2	2	1	1	2	1	2	3	3	2
CO6	3	3	3	3	3	2	2	2	2	2	2	3	3	3	3
SUM	18	15	15	15	11	8	8	7	7	9	7	10	16	15	11
AVG	3	2.5	2.5	2.5	1.8333	1.3333	1.3333	1.1666	1.1666	1.5	1.1666	1.6666	2.6666	2.5	1.8333

Course Code With Course Name: U23EEV54 SMPS and UPS

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to

CO1	Demonstrate the working of buck boost and buck- boost converters in continuous and discontinuous conduction mode.
CO2	Build buck/boost converters using suitable design method
CO3	Analyse the behaviours of isolated DC-DC converters and to design SMPS for battery operated vehicle.
CO4	Compute state space averaged model and transfer function for buck, boost and buck boost converters.
CO5	Demonstrate the P, PI and PID controller performance analytically and by simulation for buck boost and buck- boost converters.
CO6	Design and implement suitable SMPS and UPS for real time application.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2								3	2	
CO2	3	2	3	2	3								3	3	
CO3	3	3	3	2	3								3	3	2
CO4	3	3	3	3	2								3	2	
CO5	3	3	3	3	3								3	2	
CO6	3	3	3	2	3				2	2		2	3	3	3
SUM	18	16	17	14	16				2	2		2	18	15	5
AVG	3	2.6666	2.8333	2.3333	2.6666				2	2		2	3	2.5	2.5

Course Code With Course Name: U23EEV55 Electrical Drives and Control

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Understand the basic requirements of motor selection for different load profiles
CO2	Analyse the steady state behaviour and stability aspects of drive systems.
CO3	Analyse the dynamic performance of the DC drive using converter and chopper control.
CO4	Simulate the induction motor drive
CO5	Design the synchronous motor drive
CO6	Design and implement controller for electrical drives

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2								3	2	
CO2	3	3	3	3	2								3	3	
CO3	3	3	3	3	3								3	3	
CO4	3	3	3	2	3								3	3	2

CO5	3	2	3	2	3								3	3	2
CO6	3	3	3	3	3				2	2		2	3	3	3
SUM	18	16	17	14	16				2	2		2	18	17	7
AVG	3	2.6666	2.8333	2.3333	2.6666				2	2		2	3	2.8333	2.3333

Course Code With Course Name: U23EEV56 Analysis of Electrical Machines

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Find the modelling for a brushed DC-Motor (Shunt, Series, Compound and separately excited motor) and to simulate DC motors using state models
CO2	Apply reference frame theory for, resistive and reactive elements (three phase)
CO3	Compute the equivalent circuit and torque of three phase induction motor and synchronous motor in machine variable arbitrary reference frame variable
CO4	Find the need and advantages of multiphase machines
CO5	Demonstrate the working of multiphase induction and synchronous machine.
CO6	Implement and analyse the electrical machines

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3								3	3	2
CO2	3	2	2	2	2								3	2	
CO3	3	3	3	3	2								3	3	
CO4	3	2	2	1	2								3	2	
CO5	3	2	3	2	3								3	3	2
CO6	3	3	3	3	3				2	2		2	3	3	3
SUM	18	15	16	14	15				2	2		2	18	16	7
AVG	3	2.5	2.6666	2.3333	2.5				2	2		2	3	2.6666	1.1666

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Course Code With Course Name: U23EEV61 Sensors and Actuators

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Analyse the Performance characteristics of Sensors, and Actuators
CO2	Illustrate the concepts of Thermal sensors and actuators
CO3	Explain the concept of Optical sensors and actuators
CO4	Narrate the concept of Electric and magnetic sensors and actuators
CO5	Apply suitable sensors and actuators for engineering applications

CO6	Design the sensors and actuators to real time application
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CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2								3	2	
CO2	3	2	2	1	2								3	2	
CO3	3	2	2	1	2								3	2	
CO4	3	2	2	1	2								3	2	
CO5	3	3	3	2	3				2	2		2	3	2	2
CO6	3	3	3	3	3				2	2		2	3	3	3
SUM	18	14	14	10	14				4	4		4	18	13	5
AVG	3	2.3333	2.3333	1.6666	2.3333				2	2		2	3	2.1666	2.5

Course Code With Course Name: U23EEV62 IoT Architecture and Framework

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Determine the supporting technologies for design of IoT applications
CO2	Apply the architecture and core modules for IoT applications

CO3	Develop IoT applications using embedded systems
CO4	Illustrate the necessary framework required for IoT application
CO5	Apply data analytics for IoT applications
CO6	Implement IoT data management to application

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2								3	2	
CO2	3	3	3	2	3								3	3	
CO3	3	3	3	2	3				2	2		2	3	3	2
CO4	3	2	2	2	2								3	2	
CO5	3	3	3	3	3					2	2	2	3	3	3
CO6	3	3	3	3	3					2	2	2	3	3	3
SUM	18	16	16	14	16				2	6	4	6	18	16	8
AVG	3	2.6666	2.6666	2.3333	2.6666				2	2	2	2	3	2.6666	2.6666

Course Code With Course Name: U23EEV63 Communication Protocols for IoT

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Describe the evolving IoT Standards
CO2	Demonstrate and visualize the data link protocols for IoT.
CO3	Elucidate the network protocols and standards for IoT
CO4	Analyse the importance of IoT Edge devices
CO5	Apply security mechanisms for protocol security
CO6	Implement communication protocols to real time application

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2								3	2	
CO2	3	2	2	2	2								3	2	
CO3	3	2	2	2	3								3	2	
CO4	3	2	3	2	3								3	3	2
CO5	3	3	3	3	3	2	2	2			2	2	3	3	3
CO6	3	3	3	3	3				2	2		2	3	3	3
SUM	18	14	15	13	16	2	2	2	2	2	2	4	18	15	8
AVG	3	2.3333	2.5	2.1666	2.6666	2	2	2	2	2	2	2	3	2.5	2.6666

Course Code With Course Name: U23EEV64 Cloud Services for IoT

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Build an appropriate cloud architecture and identify the cloud services
CO2	Handle various sensors and the technologies
CO3	Develop IoT applications using cloud platforms
CO4	Integrate the IoT applications into the cloud services
CO5	Access the security issues in applications and networks
CO6	Implement cloud services to real time application

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	3								3	3	

CO2	3	2	2	2	2								3	2	
CO3	3	3	3	2	3				2	2		2	3	3	2
CO4	3	3	3	2	3				2	2		2	3	3	2
CO5	3	3	3	3	3	2	3	2			2	2	3	3	3
CO6	3	3	3	3	3				2	2		2	3	3	3
SUM	18	16	17	14	17	2	3	2	6	6	2	8	18	17	10
AVG	3	2.6666	2.8333	2.3333	2.6666	2	3	2	2	2	2	2	3	2.8333	1.6666

Course Code With Course Name: U23EEV65 Big Data Analytics for IoT

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Integrate big data and IoT for IoT analytics
CO2	Process IoT real-time and linked stream data
CO3	Process and handle IoT Big data using Apache Hadoop
CO4	Work with multimedia Big Data and IoT
CO5	Design and implement smart IoT systems with big data

CO6	Implement smart systems using IOT application
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CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	3							2	3	3	2
CO2	3	3	3	3	3							2	3	3	3
CO3	3	3	3	2	3							2	3	3	2
CO4	3	2	3	2	3							2	3	3	2
CO5	3	3	3	3	3				2	2		2	3	3	3
CO6	3	3	3	3	3				2	2		2	3	3	3
SUM	18	16	18	15	18				4	4		12	18	18	15
AVG	3	2.6666	3	2.5	3				2	2		2	3	3	2.5

Course Code With Course Name: U23EEV66 Architecting Smart IoT Devices

Course Code	Course Outcomes
	On Successful Completion of the Course, Students will be able to
CO1	Learn the basic concepts of Smart Grid

CO2	Understand the contribution of Energy Management System
CO3	Know the importance of Distribution Management System
CO4	Understand the working of Smart meters
CO5	Learn the Concepts of Communication networks and IOT
CO6	Implement smart IOT devices to application

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2								3	2	
CO2	3	2	2	2	2								3	2	
CO3	3	2	2	2	2								3	2	
CO4	3	2	2	2	2								3	2	2
CO5	3	2	3	2	3								3	3	2
CO6	3	3	3	3	3				2	2		2	3	3	3
SUM	18	13	14	12	14				2	2		2	18	14	7
AVG	3	2.1666	2.3333	2	2.3333				2	2		2	3	2.3333	2.3333

VERTICAL VII

COURSE CODE WITH COURSE NAME: **U23EEV71 - MODEL BASED CONTROL**

Course code	Course Outcome
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Ability to apply engineering knowledge to understand the control schemes on MIMO systems
CO2	Ability to design controller for MIMO system.
CO3	Ability to analyze the control schemes available in industries.
CO4	Ability to design MPC, Adaptive controllers for practical engineering problems
CO5	Ability to analyze MARS technique
CO6	Ability to choose suitable controllers for the given problems

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	3	1	2	0	1	0	0	2			
CO2	3	3	3	2	3	1	2	0	1	1	1	3			
CO3	3	3	2	2	2	2	2	0	1	0	1	2			
CO4	3	3	3	2	3	2	2	0	1	0	1	3			
CO5	3	3	2	2	2	1	2	0	1	0	0	2			
CO6	3	3	3	2	3	1	2	0	1	0	1	3			
SUM	18	17	15	12	16	8	12	0	6	1	4	15			
AVG	3	2.8	2.5	2	2.6	1.3	2	0	1	1	1	2.5			

COURSE CODE WITH COURSE NAME: **U23EEV72 - NON LINEAR CONTROL**

Course code	<i>Course Outcome</i>
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Able to apply the knowledge gained on state feedback control and nonlinear control
CO2	Ability to carry out analysis for common nonlinearities in a system.
CO3	Apply advanced control theory to practical engineering problems.
CO4	Design optimal controller
CO5	Understand the basics and Importance of Kalman filter
CO6	Ability to choose suitable controllers for the given problems

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	3	1	2	0	1	0	0	2	2	2	2
CO2	3	3	3	2	3	1	2	0	1	0	0	2	2	2	2
CO3	3	3	3	2	3	2	2	0	1	0	1	3	2	2	2
CO4	3	3	3	2	3	1	2	0	1	0	1	3	2	2	2
CO5	3	2	2	2	3	1	2	0	0	0	0	2	2	2	2
CO6	3	3	3	2	3	1	2	0	1	0	1	3	2	2	2
SUM	18	16	16	12	18	7	12	0	5	0	3	15	12	12	12
AVG	3	2.6	2.6	2	3	1.16	2	0	1	0	1	2.5	2	2	2

COURSE CODE WITH COURSE NAME: **U23EEV73 - OPTIMAL CONTROL**

Course code	Course Outcome
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Explain different type of optimal control problems such as time-optimal, fuel optimal energy optimal control problems
CO2	Design Linear Quadratic Regulator for Time-invariant and Time-varying Linear system(Continuous time and Discrete-time systems)
CO3	Design optimal controller using Dynamic Programming Approach and H-J-B equation
CO4	Explain the Pontryagin Minimum Principle
CO5	Design optimal controller in the presence of state constraints and time optimal controller
CO6	Explain various types of fault tolerant control schemes such as Passive and active approaches

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	1	2	0	0	0	0	3	2	2	2
CO2	3	3	3	2	3	1	2	0	1	0	1	3	2	2	2
CO3	3	3	3	3	3	1	2	0	1	0	1	3	2	2	2
CO4	3	3	2	3	3	1	2	0	0	0	0	3	2	2	2
CO5	3	3	3	3	3	1	2	0	1	0	1	3	2	2	2
CO6	3	2	2	2	2	2	2	1	1	1	1	3	2	2	2
SUM	18	17	15	15	17	7	12	1	4	1	4	18	12	12	12
AVG	3	2.8	2.5	2.5	2.8	1.16	2	1	1	1	1	3	2	2	2

COURSE CODE WITH COURSE NAME: U23EEV74 - ADAPTIVE CONTROL

Course code	Course Outcome
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Ability to apply the estimation algorithm to estimate the parameters of the process
CO2	Ability to apply the adaptive control concepts to control a process.
CO3	Use appropriate software tools for design of adaptive controllers and analysis of the process
CO4	Identify, formulate, and carry out research by designing suitable adaptive schemes for complex instrumentation problem
CO5	Apply the concepts to design adaptive control for multidisciplinary problem.
CO6	Ability to design MARS and STR

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	1	2	0	0	0	0	3	2	2	2
CO2	3	3	3	2	3	1	2	0	1	0	1	3	2	2	2
CO3	3	3	3	2	3	1	2	0	1	0	1	3	2	2	2
CO4	3	3	3	3	3	1	2	1	1	1	1	3	2	2	2
CO5	3	3	3	2	3	2	3	1	1	1	1	3	2	2	2
CO6	3	3	3	2	3	1	2	0	1	0	1	3	2	2	2
SUM	18	18	17	14	18	7	13	2	5	2	5	18	12	12	12
AVG	3	3	2.8	2.3	3	1.16	2.16	1	1	1	1	3	2	2	2

COURSE CODE WITH COURSE NAME: **U23EEV75 - COMPUTER CONTROL OF PROCESSES**

Course code	Course Outcome
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Develop mathematical models for discrete time systems using state variable techniques and analyze the stability of the system.
CO2	Construct models from input-output data by least square and recursive least square method.
CO3	Ability to design different digital controllers to satisfy the required criterion
CO4	Design a multi-loop controller and multivariable controller for multi-variable systems
CO5	Ability to design multivariable dynamic matrix controller for industrial processes
CO6	Ability to design multivariable regulatory control.

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	1	2	0	0	0	0	3	2	2	2
CO2	3	3	2	3	3	1	2	0	0	0	0	3	2	2	2
CO3	3	3	3	2	3	1	2	0	1	0	1	3	2	2	2
CO4	3	3	3	2	3	1	2	0	1	1	1	3	2	2	2
CO5	3	3	3	2	3	1	2	0	1	1	1	3	2	2	2
CO6	3	3	3	2	3	1	2	0	1	0	1	3	2	2	2
SUM	18	18	16	14	18	6	12	0	4	2	4	18	12	12	12
AVG	3	3	2.6	2.3	3	1	2	0	1	1	1	3	2	2	2

COURSE CODE WITH COURSE NAME: U23EEV76 - MACHINE MONITORING SYSTEM

Course code	<i>Course Outcome</i>
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Ability to identify the faults in machinery.
CO2	Choose the proper maintenance strategies and condition monitoring techniques for identification of failure in a machine.
CO3	Construct a classifier model for machine learning based fault diagnosis.
CO4	Predict the faulty component in a machine by analyzing the acquired vibration signals.
CO5	Ability to explain condition monitoring in nuclear plant components
CO6	Ability to analyze & build a model using modern tools.

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	1	2	0	1	0	0	2	1	2	1
CO2	3	3	2	2	2	1	2	0	1	0	1	3	1	2	1
CO3	3	3	3	3	3	2	3	0	1	0	1	3	1	2	1
CO4	3	3	2	2	2	1	2	0	1	0	1	3	1	2	1
CO5	3	2	2	2	2	2	2	1	0	0	1	2	1	2	1
CO6	3	3	3	3	3	1	3	0	1	1	1	3	1	2	1
SUM	18	17	14	14	14	8	14	1	5	1	5	16	6	12	6
AVG	3	2.8	2.3	2.3	2.3	1.3	2.3	1	1	1	1	2.6	1	2	1

VERTICAL VIII

COURSE CODE WITH COURSE NAME: **U23EEV81-HYBRID ENERGY TECHNOLOGY**

Course code	<i>Course Outcome</i>
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Analyse the impacts of hybrid energy technologies on the environment and demonstrate them to harness electrical power.
CO2	Select a suitable Electrical machine for Wind Energy Conversion Systems and simulate wind energy conversion system
CO3	Design the power converters such as AC-DC, DC-DC, and AC-AC converters for SPV systems
CO4	Analyse the power converters such as AC-DC, DC-DC, and AC-AC converters for Hybrid energy systems
CO5	Interpret the hybrid renewable energy systems
CO6	Analyse the performance of the various hybrid energy systems

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	1	3	3			1	0	1	1	2	2
CO2	3	2	3	2	2		2		1	1	1	1	1	2	2
CO3	3	2	3	2	3		2			1	1	1	1	2	2
CO4	3	3	3	2	3		2			1	1	1	1	2	2
CO5	3	3	2	2	2	2	3			1	1	1	1	2	2
CO6	3	3	3	2	2	2	3		1	1	1	1	1	2	2

SUM	18	15	16	12	13	7	15		2	6	5	6	6	12	12
AVG	3	2.5	2.6	2	2.16	1.16	2.5		1	1	0.8	1	1	2	2

COURSE CODE WITH COURSE NAME: U23EEV82- ENERGY STORAGE SYSTEMS

Course code	<i>Course Outcome</i>
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Understand different types storage technologies
CO2	Design a thermal storage system
CO3	Model battery storage system
CO4	Analyse the thermodynamics of fuel cell
CO5	Analyse the appropriate storage technologies for different applications
CO6	Analyse the performance of fuel cell and different storages systems.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	2	2				0	1	2	2	2
CO2	3	2	3	2	2	1	2				1	1	2	2	2
CO3	3	3	3	2	3	0	2				1	1	2	2	2
CO4	3	3	3	2	2	2	3				1	1	2	2	2
CO5	3	3	2	2	2	2	3		1		1	1	2	2	2
CO6	3	3	3	2	2	2	3				1	1	2	2	2
SUM	18	16	16	11	13	9	15		1		5	6	12	12	12
AVG	3	2.6	2.6	1.8	2.16	1.5	2.5		1		0.8	1	2	2	2

COURSE CODE WITH COURSE NAME: U23EEV83- SUSTAINABLE AND ENVIRONMENTAL FRIENDLY HV INSULATION SYSTEM

Course code	Course Outcome
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Know about environmental energy and products.
CO2	Know about sustainable energy and products.
CO3	Describe the alternate green gaseous insulators
CO4	Describe the alternate green liquid insulators
CO5	Describe the alternate green solid insulators
CO6	Elaborate the standards for Green insulation systems.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	2	3	1		1		2	1	1	2
CO2	3	2	2	1	1	2	3	1		1		3	1	1	2
CO3	3	2	2	2	2	1	3					2	1	1	2
CO4	3	2	2	2	2	1	3					2	1	1	2
CO5	3	2	2	2	2	1	3					2	1	1	2
CO6	3	2	3	2	2	1	3					2	1	1	2

SUM	18	12	13	10	10	8	18	2		2		13	6	6	12
AVG	3	2	2.16	1.6	1.6	1.3	3	1		1		2.16	1	1	2

COURSE CODE WITH COURSE NAME: U23EEV84- GRID INTEGRATING TECHNIQUES AND CHALLENGES

Course code	Course Outcome
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Review the power sector scenario in India.
CO2	Model a microgrid system
CO3	Model a converter for power grid distributed system.
CO4	Integrate wind energy system.
CO5	Simulate three phase inverter with fixed and sine PWM.
CO6	Ability to explain Power Quality issues.

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1	1	1		1	1	1	1	2	1	2	2
CO2	3	2	3	2	3	3			1		1	2	1	2	2
CO3	3	2	3	2	3	3			1		1	2	1	2	2
CO4	3	2	3	2	2	2						2	1	2	2
CO5	3	2	3	3	3	3						2	1	2	2
CO6	3	3	2	2	2	2		1	1	1		2	1	2	2
SUM	17	13	15	12	14	14		2	4	2	3	12	6	12	12

AVG	2.8	2.16	2.5	2	2.3	2.3		1	1	1	1	2	1	2	2
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COURSE CODE WITH COURSE NAME: U23EEV85- DESIGN AND MODELLING OF RENEWABLE ENERGY SYSTEMS

Course code	Course Outcome
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Review the perspectives of renewable energy systems
CO2	Integrate photovoltaic systems with grid
CO3	Study inverter for PV systems
CO4	Elaborate the working of small wind power systems
CO5	Study the features of induction machine and doubly fed induction machine
CO6	To make a design on DFIG and PMSG wind energy conversion systems.

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	2	3	0	1	1	0	3	2	2	2
CO2	3	2	3	2	3	1	3	0	1	0	0	2	2	2	2
CO3	3	2	3	2	3	1	2	0	0	0	0	2	2	2	2
CO4	3	2	2	2	2	2	3	0	1	0	0	2	2	2	2
CO5	3	2	2	2	2	1	2	0	1	0	0	2	2	2	2

CO6	3	2	3	2	3	1	3	0	1	0	0	3	2	2	2
SUM	18	12	15	11	15	8	16	0	5	1	1	14	12	12	12
AVG	3	2	2.5	1.83	2.5	1.3	2.6	0	0.8	1	1	2.3	2	2	2

COURSE CODE WITH COURSE NAME: U23EEV86- PLC PROGRAMMING

Course code	<i>Course Outcome</i>
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Understand the basics and need for Automation in industries
CO2	Explain the logic and flow of any particular programming written for a process
CO3	Apply the knowledge to design or improve an existing program to increase productivity of any process
CO4	Breakdown SCADA architecture and communication protocols
CO5	Build and logic in any of the programming languages from IEC- 61131- 3 standards.
CO6	Explain VPLC programming Concept.

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	1			1	1	0	2			
CO2	3	3	2	2	3	1			1	1	0	2			
CO3	3	2	3	2	3	1			1	0	1	2			
CO4	3	2	2	2	3	1			0	0	0	2			
CO5	3	2	3	2	3	1			1	0	1	2			

CO6	3	2	2	1	3	1			0	1	0	2			
SUM	18	13	14	10	17	6			4	3	2	12			
AVG	3	2.16	2.3	1.6	2.8	1			1	1	1	2			

OPEN ELECTIVE

COURSE CODE WITH COURSE NAME: U23MEV36- RENEWABLE ENERGY TECHNOLOGIES

Course code	<i>Course Outcome</i>
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Discuss the Indian and global energy scenario.
CO2	Describe the various solar energy technologies and its applications.
CO3	Explain the various wind energy technologies.
CO4	Explore the various bio-energy technologies
CO5	Discuss the ocean and geothermal technologies.
CO6	Implement the renewable energy resources to the real time application

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	3	3	1	0	1	0	3	2	2	2
CO2	3	2	2	2	2	2	3	0	0	0	0	2	2	2	2
CO3	3	2	2	2	2	2	3	0	0	0	0	2	2	2	2

CO4	3	2	2	1	2	2	3	0	0	0	0	2	2	2	2
CO5	3	2	2	1	2	2	3	0	0	0	0	2	2	2	2
CO6	3	3	3	2	3	2	3	1	1	1	0	3	2	2	2
SUM	18	13	12	9	12	13	18	2	1	2	1	14	12	12	12
AVG	3	2.16	2	1.6	2	2.16	3	1	1	1	1	2.3	2	2	2

COURSE CODE WITH COURSE NAME: U23EE012- ELECTRIC AND HYBRID VEHICLES

Course code	<i>Course Outcome</i>
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Understand the operation and architecture of electric and hybrid vehicles
CO2	Identify various energy source options like battery and fuel cell.
CO3	Select suitable electric motor for applications in hybrid and electric vehicles
CO4	Explain the role of power electronics in hybrid and electric vehicles
CO5	Analyse the energy and design requirement for hybrid and electric vehicles
CO6	Implement various techniques of hybrid and electric vehicles to real time application

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	2	3	0	1	1	0	3	2	3	2
CO2	3	2	2	2	3	2	3	0	0	0	0	2	2	3	2
CO3	3	2	3	2	3	1	2	0	0	0	0	2	2	3	2
CO4	3	2	3	2	3	1	2	0	0	0	0	2	2	3	2

CO5	3	3	3	2	3	2	3	0	1	0	0	3	2	3	2
CO6	3	3	3	2	3	2	3	1	1	1	1	3	2	3	2
SUM	18	14	16	11	17	10	16	1	3	2	1	15	12	18	12
AVG	3	2.3	2.6	1.8	2.8	1.6	2.6	1	1	1	1	2.5	2	3	2

COURSE CODE WITH COURSE NAME: U23EE013- ENERGY CONSERVATION AND MANAGEMENT

Course code	<i>Course Outcome</i>
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Remember the knowledge for Basic combustion and furnace design and selection of thermal and mechanical energy equipment.
CO2	Study the Importance of Stoichiometry relations, Theoretical air required for complete combustion
CO3	Skills on combustion thermodynamics and kinetics
CO4	Apply calculation and design tube still heaters.
CO5	Studied different heat treatment furnace
CO6	Practical and theoretical knowledge burner design.

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	2	3	0	1	1	0	3	1	1	1
CO2	3	2	2	2	2	2	3	0	0	0	0	2	1	1	1

CO3	3	2	2	2	2	1	2	0	0	0	0	2	1	1	1
CO4	3	3	3	2	3	1	2	0	1	0	1	2	1	1	1
CO5	3	2	2	1	2	1	2	0	0	0	0	2	1	1	1
CO6	3	2	3	2	3	1	2	0	1	0	0	2	1	1	1
SUM	18	13	14	10	14	8	14	0	3	1	1	13	6	6	6
AVG	3	2.16	2.3	1.6	2.3	1.3	2.3	0	1	1	1	2.16	1	1	1

COURSE CODE WITH COURSE NAME: U23ECO12- FUNDAMENTALS OF ELECTRONIC DEVICES AND CIRCUITS

Course code	<i>Course Outcome</i>
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Explain the structure and working operation of basic electronic devices.
CO2	Design and analyze amplifiers
CO3	Analyze frequency response of BJT and MOSFET amplifiers
CO4	Design and analyze feedback amplifiers and oscillator principles
CO5	Design and analyze power amplifiers and supply circuits
CO6	Implement the electronics devices to real time application

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	1	2	0	0	1	0	3	2	2	2

CO2	3	2	3	2	3	1	2	0	1	0	0	2	2	2	2
CO3	3	2	2	2	2	1	2	0	0	0	0	2	2	2	2
CO4	3	2	3	2	3	1	2	0	1	0	0	2	2	2	2
CO5	3	2	3	2	3	1	2	0	1	0	0	2	2	2	2
CO6	3	3	3	2	3	1	2	1	1	1	1	3	2	2	2
SUM	18	13	16	11	16	6	12	1	5	2	1	14	12	12	12
AVG	3	2.16	2.6	1.8	2.6	1	2	1	1	1	1	2.3	2	2	2

COURSE CODE WITH COURSE NAME: U23EE015- BATTERIES AND MANAGEMENT SYSTEM

Course code	<i>Course Outcome</i>
<i>On Successful completion of the course, Student will be able to,</i>	
CO1	Acquire knowledge of different Li-ion Batteries performance.
CO2	Design a Battery Pack and make related calculations.
CO3	Demonstrate a Battery Model or Simulation
CO4	Estimate State-of-Charge sin a Battery Pack.
CO5	Approach different BMS architectures during real world usage.
CO6	Use the batteries to real time application

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	2	3	0	0	1	0	3	2	2	2
CO2	3	2	3	2	3	1	2	0	1	0	1	2	2	2	2
CO3	3	2	3	2	3	1	2	0	1	0	0	2	2	2	2
CO4	3	3	3	2	3	1	2	0	1	0	1	3	2	2	2
CO5	3	2	3	2	3	2	3	1	1	1	1	3	2	2	2
CO6	3	3	3	2	3	2	3	1	1	1	1	3	2	2	2
SUM	18	14	17	11	17	9	15	2	5	3	4	16	12	12	12
AVG	3	2.3	2.8	1.8	2.8	1.5	2.5	1	1	1	1	2.6	2	2	2

COURSE CODE WITH COURSE NAME: U23EE021- AUTOMOTIVE ELECTRICAL AND ELECTRONICS

Course code	Course Outcome
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	List common types of sensor and actuators used in vehicles
CO2	Design measuring equipment's for the measurement of pressure force, temperature and flow
CO3	Generate new ideas in designing the sensors and actuators for automotive application
CO4	Understand the operation of the sensors, actuators and electronic control
CO5	Understand the operation of Electromechanical actuators
CO6	Design temperature control actuators for vehicles.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	1	2	0	0	1	0	3	2	2	2
CO2	3	2	3	2	3	1	2	0	1	0	1	2	2	2	2
CO3	3	2	3	2	3	2	2	1	1	1	1	3	2	2	2
CO4	3	2	2	2	2	1	2	0	0	0	0	2	2	2	2
CO5	3	2	2	2	2	1	2	0	0	0	0	2	2	2	2
CO6	3	2	3	2	3	1	2	0	1	0	1	2	2	2	2
SUM	18	12	15	11	15	7	12	1	3	2	3	14	12	12	12
AVG	3	2	2.5	1.8	2.5	1.16	2	1	1	1	1	2.3	2	2	2

COURSE CODE WITH COURSE NAME: U23EE022- ELECTRICAL, ELECTRONIC AND MAGNETIC MATERIALS

Course code	Course Outcome
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Understand various types of dielectric materials, their properties in various conditions
CO2	Evaluate magnetic materials and their behavior.
CO3	Evaluate semiconductor materials and technologies
CO4	Select suitable materials for electrical engineering applications
CO5	Understand the operation of thermocouple materials
CO6	Identify right material for optical and optoelectronic applications

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	3	0	0	1	0	3	2	2	2
CO2	3	2	2	2	2	1	2	0	0	0	0	2	2	2	2
CO3	3	2	2	2	3	1	2	0	0	0	0	2	2	2	2
CO4	3	2	3	2	2	1	2	0	1	1	1	2	2	2	2
CO5	3	2	2	1	2	1	2	0	0	0	0	2	2	2	2
CO6	3	2	2	2	3	1	2	0	0	0	1	2	2	2	2
SUM	18	12	13	11	14	7	13	0	1	2	2	13	12	12	12
AVG	3	2	2.16	1.8	2.3	1.16	2.16	0	1	1	1	2.16	2	2	2

COURSE CODE WITH COURSE NAME: U23EE023- INTRODUCTION TO INDUSTRIAL AUTOMATION SYSTEMS

Course code	Course Outcome
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Design a signal conditioning circuits for various application
CO2	Acquire detail knowledge on data acquisition system interface and DCS system
CO3	Understand the basics and Importance of communication buses in applied automation Engineering
CO4	Ability to design PLC Programmes by Applying Timer/Counter and Arithmetic and Logic Instructions Studied for Ladder Logic and Function Block.
CO5	Able to develop a PLC logic for a specific application on real world problem
CO6	Understand features and advantages of DCS

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	1	2	0	1	0	1	2			
CO2	3	2	2	2	3	2	2	0	0	0	0	2			
CO3	3	2	2	1	2	1	2	0	0	1	0	2			
CO4	3	3	3	2	3	1	2	0	1	1	1	3			
CO5	3	3	3	2	3	2	2	0	1	1	1	3			
CO6	3	2	2	1	2	2	2	0	0	1	0	2			
SUM	18	14	15	10	16	9	12	0	3	4	3	14			
AVG	3	2.3	2.5	1.6	2.6	1.5	2	0	1	1	1	2.3			

COURSE CODE WITH COURSE NAME: U23RAV28- INDUSTRIAL SAFETY

Course code	<i>Course Outcome</i>
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Describe, with example, the common work-related diseases and accidents in occupational setting
CO2	Name essential members of the Occupational Health team
CO3	What roles can a community health practitioners play in an Occupational setting
CO4	Describe Safe Systems of work for manual handling operations
CO5	To ensure the protection, promotion and maintenance of the health of the employee
CO6	Understand the Concept of Environmental Health and Safety Management

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	3	3	1	1	1	0	3			
CO2	2	1	1	1	1	3	2	1	1	1	0	2			
CO3	2	1	1	1	1	3	2	2	2	1	1	2			
CO4	3	2	2	1	2	3	3	1	1	1	0	3			
CO5	3	2	2	1	1	3	3	2	1	1	0	3			
CO6	3	2	2	2	1	3	3	1	1	1	1	3			
SUM	16	10	9	7	7	18	16	8	7	6	2	16			
AVG	2.6	1.6	1.5	1.16	1.16	3	2.6	1.3	1.16	1	1	2.6			

COURSE CODE WITH COURSE NAME: U23EE025- ELECTRIC POWER GENERATION

Course code	<i>Course Outcome</i>
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Maintain the optimised working of the thermal power plant.
CO2	Maintain the optimised working of large and micro hydro power plants.
CO3	Maintain the optimised working of solar and biomass-based power plants.
CO4	Maintain the optimised working of wind power plants.
CO5	Select the adequate mix of power generation based on economic operation.
CO6	Basic layout of substation and Grounding systems

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	2	0	1	1	1	2	2	2	2
CO2	3	2	2	2	2	2	3	0	1	1	0	2	2	2	2
CO3	3	2	2	2	2	2	3	0	1	0	0	2	2	2	2
CO4	3	2	2	2	2	2	3	0	1	0	0	2	2	2	2
CO5	3	3	3	2	2	2	3	0	1	1	1	3	2	2	2
CO6	3	2	2	1	2	2	2	0	1	0	1	2	2	2	2
SUM	18	13	13	11	12	12	16	0	6	3	3	13	12	12	12
AVG	3	2.3	2.3	1.8	2	2	2.6	0	1	1	1	2.3	2	2	2

COURSE CODE WITH COURSE NAME: U23RAO12- ELEMENTS OF INDUSTRIAL AUTOMATION SYSTEM

Course code	Course Outcome
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Recognize the various concepts of fluid power and PLC systems.
CO2	Comprehend functions of fluid power and PLC systems.
CO3	Explain the various standard fluid power circuits, functions, communication and IO details of PLC
CO4	Demonstrate the standard fluid power circuits and PLC based interfaces.
CO5	Construct the fluid power circuits and PLC based automation system
CO6	Demonstrate the Data Communication And Supervisory Control System

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2					1	1		1	2		2
CO2	3	2	3	2					1	1		1	2		2
CO3	3	3	3	3					1	1	1	2	2		2
CO4	2	2	3	3					2	2	1	2	2		2
CO5	2	3	3	3					2	2	1	2	2		2
CO6	2	2	2	3					2	2	2	3	2		2
SUM	15	14	16	16					9	9	5	11	12		12
AVG	2.5	2.3	2.6	2.6					1.5	1.5	0.8	1.8	2		2

COURSE CODE WITH COURSE NAME: U23CST64 - INFORMATION SECURITY

Course code	Course Outcome
	<i>On Successful completion of the course, Student will be able to,</i>
CO1	Discuss the basics of information security.
CO2	Illustrate the legal, ethical and professional issues in information security
CO3	Explain the basics of risk assessment and control
CO4	Describe various security models, standards and frameworks
CO5	Illustrate the tools that are used for security analysis.
CO6	Explain the access control mechanisms to safeguard information systems and prevent unauthorized access.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1		2	1		2		1		1			
CO2	2	1			1	3	2	3	1	2	2	1			
CO3	3	2	2	1	2	1		2		1		2			
CO4	3	2	2	1	2		1	2		1	1	1			
CO5	3	2	3	2	3			1		1	1	2			
CO6	3	2	3	2	3	1		1		1	1	2			
SUM	17	11	11	6	13	6	3	11	1	7	5	9			
AVG	2.8	1.8	1.8	1.5	2.16	1.5	1.5	1.8	1	1.16	0.8	1.5			

