Yeshwantrao Chavan College of Engineering, Nagpur
Name of the Department: Electrical Engineering
Name of the UG Programme: B.Tech. in Electrical Engineering
Session 2024-25

PO Statements
At the end of Program, Graduate students will have
Program Outcomes (POs)

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4) .
PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies

PSO1: Interpret, identify, analyse and evaluate problems in power system operation, control and design.

PSO2: Demonstrate knowledge to develop, control and assess electrical and electronic systems.

Knowledge Profiles (WK):

WK1: Understanding of natural and social sciences.

WK2: Mathematics, numerical analysis, data analysis, and computing.

WK3: Engineering fundamentals.

WK4: Specialized engineering knowledge.

WK5: Engineering design and operations, including sustainability.

WK6: Engineering practice (technology).

WK7: Role of engineering in society, sustainability, and professional responsibility.

WK8: Current research literature and critical thinking.

WK9: Ethics, professional responsibilities, and inclusive behaviour.

III SEMESTER

Bloom's Level		Course Name: Electrical Energy Generation System (T) Course Code: 23EL1301
L1	CO1	**Describe** types of renewable energy sources and different factors associated with a generating station
L2	CO2	**Cite** various parameters related to selection and application of Solar ,Wind Energy and Biogas
L4	CO3	**Analyze** various parameters for Hydro and Thermal Power generating Systems.
L3	CO4	**Explain** various parameters related to generation of Nuclear Power

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L1	CO1	3	3	3	2	1	3	1	1	1		2	3	1
L2	CO2	3	3	3	2	1	3	1	1	1		2	3	1
L4	CO3	3	3	3	2	1	3	1	1	1		2	3	1
L3	CO4	3	3	3	2	1	3	1	1	1		2	3	1
AVERAGE		3.00	3.00	3.00	2.00	1.00	3.00	1.00	1.00	1.00		2.00	3.00	1.00

Bloom's Level		Course Name: Renewable Energy Sources (P) Course Code: 23EL1302
L5	CO1	**Evaluate** the performance of solar photovoltaic system
L4	CO2	**Analyze** the performance of Solar Water Heater system
L2	CO3	**Demonstrate** the working of Solar Wind Hybrid system
L2	CO4	**Explain** Biomass energy conversion systems.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L5	CO1	3	2	3	3	3	3	1	2	1		2	2	
L4	CO2	3	2	2	3	2	3	1	2	1		2	2	
L2	CO3	3	1	1	3	2	3	1		1		2	2	
L2	CO4	3	1	1	3	2	3	1	1	1		2	2	
AVERAGE		3.00	1.50	1.75	3.00	2.25	3.00	1.00	1.67	1.00		2.00	2.00	

Bloom's Level		Course Name: Network Analysis (T) Course Code: 23EL1303
L3	CO1	**Apply** node voltage and mesh current analysis methods to electric circuits.
L3	CO2	**Apply** network theorems to electric circuits.
L3	CO3	**Determine** initial and final values of current and voltage of electric circuits containing energy storage elements.
L3	CO4	**Apply** Laplace transform to electric circuits.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L3	CO1	3	3	1	1	1		1	1	1		3	3	2
L3	CO2	3	3	1	1	1		1	1	1		3	3	2
L3	CO3	3	3	1	1	1		1	1	1		3	3	1
L3	CO4	3	3	1	1	1		1	1	1		3	3	1
AVERAGE		3.00	3.00	1.00	1.00	1.00		1.00	1.00	1.00		3.00	3.00	1.50

Bloom's Level		Course Name: Electrical Engineering Workshop (P) Course Code: 23EL1304
L2	CO1	**Identify** and explain the construction, working principles, and troubleshooting of common electrical appliances, including ceiling fans, electric irons, and mixers.
L3	CO2	**Demonstrate** the measurement of earth resistance, insulation resistance, and testing of electrical components like DC motors and transformers.
L4	CO3	**Analyze** and assemble electrical systems, including starters (DOL and Star-Delta), solar rooftop installations, and center-tapped transformers, to meet functional requirements.
L5	CO4	**Evaluate** the design and functionality of electrical infrastructure, including transmission towers, insulators, and power cables, ensuring reliability and safety in power systems.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	2	1		2	2			1			2	3
L3	CO2	3	3	2	3	3	2			2	1		3	3
L4	CO3	3	3	3	3	3	3	2	1	2	2	2	3	3
L5	CO4	3	2	2	2	3	3	3		2	2	2	3	3
AVERAGE		3.00	2.50	2.00	2.67	2.75	2.50	2.50	1.00	1.75	1.67	2.00	2.75	3.00

Bloom's Level		Course Name: Electrical Machines (T) Course Code: 23EL1305
L4	CO1	**Analyze** the performance of Transformers.
L4	CO2	**Illustrate** proficiency in understanding the performance of D.C. Machines
L4	CO3	**Evaluate** the performance of Induction Motors.
L4	CO4	**Explain** working of Special Machines.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L4	CO1	2	2	2	1	1	1	1	1	2	2	2	3	3
L4	CO2	3	3	3	2	2	1	1	1	2	2	2	3	3
L4	CO3	3	3	3	2	2	1	1	1	2	2	2	2	3
L4	CO4	3	3	3	2	2	1	1	1	2	2	2	2	3
		2.75	2.75	2.75	1.75	1.75	1.00	1.00	1.00	2.00	2.00	2.00	2.50	3.00

Bloom's Level		Course Name: Electrical Machines (P) Course Code: 23EL1306
L4	CO1	**Analyze** the performance of three phase transformers.
L2	CO2	**Illustrate** proficiency in understanding the performance of dc machines.
L5	CO3	**Evaluate** the performance of Induction motors.
L2	CO4	**Demonstrate** the operation of Induction Generator.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L4	CO1	3	3	3	2	2	1	1	2	1		2	2	2
L2	CO2	3	3	3	2	2	1	1	2	1		2	2	2
L5	CO3	3	3	3	2	2	1	1	2	1		2	2	2
L2	CO4	3	3	3	2	2	1	1	2	1		2	2	2
AVERAGE		3.00	3.00	3.00	2.00	2.00	1.00	1.00	2.00	1.00	#DIV/0!	2.00	2.00	2.00

Bloom's Level		Course Name: Introduction to Electric Vehicles (T) Course Code: MDM1EL101
L2	CO1	**Explain** the classification of electric vehicles (EVs), and compare them with internal combustion engines (ICEs).
L4	CO2	**Analyze** different types of EV chargers and their design ratings.
L3	CO3	**Apply** knowledge of charging connectors and communication protocols for AC and DC chargers as per international standards.
L6	CO4	**Design** a preliminary EV charging station, including the selection and sizing of electrical components.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	2	2	1	1	2	2	1	1		1	3	2
L4	CO2	3	3	3	2	2	1	2	1	1		1	3	3
L3	CO3	3	3	3	3	3	1	2	1	1		1	3	3
L6	CO4	3	3	3	3	2	2	3	1	2		2	3	3
AVERAGE		3.00	2.75	2.75	2.25	2.00	1.50	2.25	1.00	1.25		1.25	3.00	2.75

Bloom's Level		Course Name: Introduction to Solar-Thermal Energy (T) Course Code: MDM1EL102
L3	CO1	**Compare** the properties and thermal analysis of flat plate and concentrating collectors
L3	CO2	**Explain** different forms of thermal energy storage
L2	CO3	**Interpret** the concept of solar pond and its applications

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L3	CO1	3	3	3	2		2	3	1	1		3	2	2
L3	CO2	3	3	3	2		2	3	1	1		3	2	2
L2	CO3			1	2		1	3	1	1		3	2	2
AVERAGE		3.00	3.00	2.33	2.00		1.67	3.00	1.00	1.00		3.00	2.00	2.00

IV SEMESTER B.TECH

Bloom's Level		Course Name: Entrepreneurship Development (T) Course Code: 23GE1401
L1	CO1	Recognize the fundamental concepts and evolution of entrepreneurship, and identify the key functions, types, and stages in the entrepreneurial process.
L3	CO2	Apply the knowledge of business organization forms, their incorporation processes, and legal compliance to manage a start-up effectively.
L4	CO3	Analyse the importance of intellectual property rights and strategies in entrepreneurship, including patents, trademarks, copyrights, and industrial designs.
L4	CO4	Identify the causes of sickness in small businesses and apply corrective measures, including business incubators and growth strategies like joint ventures, mergers, and diversification.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L1	CO1	2	1				2			3				
L3	CO2	2				1	2			3				
L4	CO3		1				2	1	1					
L4	CO4							1		3	1	1		
AVERAGE		2.00	1.00			1.00	2.00	1.00	1.00	3.00	1.00	1.00		

Bloom's Level		Course Name: Electrical Measurement and Instrumentation (T) Course Code: 23EL1401
L2	CO1	Explain the measurement of voltage, current and impedance.
L5	CO2	Evaluate power and energy measurement and solve issues related to them.
L3	CO3	Make use of Instrument Transformers in high power measurement.
L3	CO4	Apply transducers for various measurements.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	2	1	1	2	1	1	1	1		2	3	3
L5	CO2	3	2	1	1	2	1	1	1	1		2	3	3
L3	CO3	3	2	1	1	2	1	1	1	1		2	3	3
L3	CO4	3	2	1	1	2	1	1	1	1		2	3	3
AVERAGE		3.00	2.00	1.00	1.00	1.00	2.00	1.00	1.00	1.00		2.00	3.00	3.00

Bloom's Level		Course Name: Electrical Measurement and Instrumentation (P) Course Code: 23EL1402
L3	CO1	**Compute** impedance with various types of bridges.
L4	CO2	**Analyze** active and reactive power in three phase circuit.
L4	CO3	**Operate** instrument transformer for measurement of power.
L2	CO4	**Demonstrate** the application of various transducer.

Bloom's Level		Course Matrix (CO PO Mapping Table)												
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L3	CO1	3	2	1	1	1	2	1	2	2		2	3	3
L4	CO2	3	2	1	1	1	2	1	2	2		2	3	3
L4	CO3	3	2	1	1	1	2	1	2	2		2	3	3
L2	CO4	3	2	1	1	1	2	1	2	2		2	3	3
AVERAGE		3.00	2.00	1.00	1.00	1.00	2.00	1.00	2.00	2.00	#DIV/0!	2.00	3.00	3.00

Bloom's Level		Course Name: Electrical Machines in Power System (T) Course Code: 23EL1403
L4	CO1	Analyze steady state performance of synchronous machines.
L3	CO2	Illustrate Synchronization, load sharing and effect of variable excitation in parallel operation of alternators.
L4	CO3	Evaluate the performance of Synchronous machine connected to infinite bus.
L2	CO4	Describe the transient behaviour of Synchronous Machine.

Bloom's Level		Course Matrix (CO PO Mapping Table)												
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L4	CO1	3	3	3	2	2	1		1	1		2	3	3
L3	CO2	3	3	2	2	2	2		1	1	1	2	3	3
L4	CO3	3	3	3	3	1		1	1	1		2	3	3
L2	CO4	2	2	2	1	1		1	1	1		2	3	3
AVERAGE		2.75	2.75	2.50	2.00	1.50	1.50	1.00	1.00	1.00	1.00	2.00	3.00	3.00

Bloom's Level		Course Name: Electrical Machines in Power System (P) Course Code: 23EL1404
L4	CO1	Experimental Investigation of steady state performance of synchronous machine
L3	CO2	Perform and Observe synchronization 3-Phase alternator to infinite bus bar.
L4	CO3	Analyze the behaviour of synchronous motor.
L2	CO4	Determine the transient state parameters of synchronous machine.

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
		Course Matrix (CO PO Mapping Table)												
L4	CO1	3	3	3	2	2		1	3	2		3	3	1
L3	CO2	3	3	2	2	2	2	1	3	2		3	3	1
L4	CO3	3	3	3	3	1		1	3	2		3	3	1
L2	CO4	3	3	2	2	2		1	3	2		3	3	1
AVERAGE		**3.00**	**3.00**	**2.50**	**2.25**	**1.75**	**2.00**	**1.00**	**3.00**	**2.00**		**3.00**	**3.00**	**1.00**

Bloom's Level		Course Name: Computer Programming (P) Course Code: 23EL1405
L2	CO1	**Explain** the basics of SCILAB scripting and matrix operations.
L3	CO2	**Develop** programs using numerical techniques and circuit analysis learned.
L3	CO3	**Solve** mathematical functions and control structures in SCILAB.
L4	CO4	**Analyze** and plot the results using SCILAB.

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	3	3	1	1	2	2		3	3	3
L3	CO2	3	3	3	3	3	1	1	2	2		3	3	3
L3	CO3	3	3	3	3	3	1	1	2	2		3	3	3
L4	CO4	3	3	3	3	3	1	1	2	2		3	3	3
AVERAGE		**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**1.00**	**1.00**	**2.00**	**2.00**		**3.00**	**3.00**	**3.00**

Bloom's Level		Course Name: Digital Signal Processing (T) Course Code: 23EL1406
L2	CO1	**Classify** mathematical representation of signals and systems in various domains
L2	CO2	**Determine** and analyze signals in time and frequency domain using Fourier series and Fourier transform
L2	CO3	**Evaluate** and analyze signals using Z-transform
L3	CO4	**Analyze** and design digital filter

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
		Course Matrix (CO PO Mapping Table)												
L2	CO1	3	3	1	1	1		1	1	1		2	2	3
L2	CO2	3	3	1	1	1		1	1	1		2	2	3
L2	CO3	3	3	1	1	1		1	1	1		2	2	3

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L3	CO4	3	3	1	1	1		1	1	1		2	2	3
AVERAGE		3.00	3.00	1.00	1.00	1.00		1.00	1.00	1.00		2.00	2.00	3.00

Bloom's Level		Course Name: Energy Storage Devices (T) Course Code: MDM2EL201
L2	CO1	**Express** the fundamentals of advanced batteries, their sizing, and applications of super-capacitors
L2	CO2	**Identify** the aspects of battery hybridization, and fuel reforms
L3	CO3	**Explain** the various battery recycling, testing procedures, and verification of battery performances
L3	CO4	**Apply** the battery management systems, thermal management systems, and aspects of battery safety

		Course Matrix (CO PO Mapping Table)												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	1	2	3	2	3	1	2	2	3	3	1	3
L2	CO2	3	2	3	3	3	3	1	2	2	3	3	3	3
L3	CO3	3	3	3	3	3	3	3	2	2	3	3	3	3
L3	CO4	3	3	3	3	3	3	3	2	2	3	3	3	3
AVERAGE		3.00	2.25	2.75	3.00	2.75	3.00	2.00	2.00	2.00	3.00	3.00	2.50	3.00

Bloom's Level		Course Name: Semiconductor material for Solar Photovoltaic Cells (T) Course Code: MDM2EL202
L2	CO1	Illustrate the fundamental principles of semiconductors and their role in solar cell materials
L2	CO2	Explain the functioning of P-N junctions under various conditions, including equilibrium, non-equilibrium, and illumination, and derive the I-V characteristics of solar cells
L3	CO3	Identify the design parameters and efficiency of solar cells by understanding losses and the upper limits of performance.
L4	CO4	Classify advanced solar cell technologies, including Si wafer production, anti-reflective coatings, and bifacial solar cells, to propose sustainable solutions.

		Course Matrix (CO PO Mapping Table)												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	2	1		1	1	1	1		2	2	2
L2	CO2	3	3	2	1		1	1	1	1		2	2	2
L3	CO3	3	3	2	1		1	1	1	1		2	2	2

L4	CO4	3	3	2	1		1	1	1	1		2	2	2
AVERAGE		3.00	3.00	2.00	1.00		1.00	1.00	1.00	1.00		2.00	2.00	2.00

V SEMESTER B.TECH

Bloom's Level		Course Name: Control System (T) Course Code: 22EL501
L3	CO1	Develop mathematical model for physical systems and evaluate their transfer function by using block diagram, signal-flow graph techniques, and state – variable analysis.
I5	CO2	Justify the need of negative feedback in control systems
L4	CO3	Analyze control systems in time and frequency domain for their specifications and stablility
L4	CO4	Analyze control system by drawing the root locus plot

		COURSE ARTICULATION MATRIX												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L3	CO1	3	2	2	2	1		1	1	1		1	2	3
I5	CO2	3	2	2	2	1		1	1	1		1	2	3
L4	CO3	3	2	2	2	1		1	1	1		1	2	3
L4	CO4	3	2	2	2	1		1	1	1		1	2	3
AVERAGE		3.00	2.00	2.00	2.00	1.00		1.00	1.00	1.00		1.00	2.00	3.00

Bloom's Level		Course Name: Control System (P) Course Code: 22EL502
L4	CO1	**Illustrate** the operation of control system components
L5	CO2	**justify** the use of advance tools such as MATLAB for analysis of control systems
L4	CO3	**Analyze** control systems for their time response specifications.
L2	CO4	**Perform** laboratory experiments and demonstrate competency in collecting, interpreting, analysing data, communicate and present effectively through laboratory journals.

		COURSE ARTICULATION MATRIX												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L4	CO1	3	2	2	3	3		1	1	2		1	2	3
L5	CO2	3	2	2	3	3		1	1	2		1	2	3
L4	CO3	3	2	2	3	3		1	1	2		1	2	3
L2	CO4	3	2	2	3	2		1	1	2		1	2	3
AVERAGE		3.00	2.00	2.00	3.00	2.75		1.00	1.00	2.00		1.00	2.00	3.00

Bloom's Level		Course Name: Power Electronics (T) Course Code: 22EL503
L2	CO1	**Demonstrate** the working, characteristics, and **show** the need of protection of power semiconductor devices and **select** them for suitable application.
L4	CO2	**Analyze** controlled single- and three-phase rectifiers, and cycloconverters
L4	CO3	**Understand** the working and **examine** the performance of DC – DC converters (Choppers).
L4	CO4	**Classify** the different single and three phase DC/AC inverters and **evaluate** their performance.

		COURSE ARTICULATION MATRIX												
Bloom's Level		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
L2	CO1	3	2	1	1			1	1	1		1	1	3
L4	CO2	3	2	2	2	1		1	1	1		1	2	3
L3	CO3	3	2	2	2	1		1	1	1		1	3	3
L4	CO4	3	2	2	2	1		1	1	1		1	3	3
AVERAGE		3.00	2.00	1.75	1.75	1.00				1.00			2.25	3.00

Bloom's Level		Course Name: Power Electronics (P) Course Code: 22EL504
L2	CO1	Trace the static and dynamic characteristics of power semiconductor devices
L4	CO2	Analyze the performance parameter of rectifier and cycloconverter
L3	CO3	Calculate the performance parameter of buck/boost converter
L4	CO4	Evaluate the performance parameter of DC/AC inverters

		COURSE ARTICULATION MATRIX												
Bloom's Level		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
L2	CO1	3	2	1	1			1	1	1		1	1	3
L4	CO2	3	2	2	2	1		1	1	1		1	2	3
L3	CO3	3	2	2	2	1		1	1	1		1	3	3
L4	CO4	3	2	2	2	1		1	1	1		1	3	3
AVERAGE		3.00	2.00	1.75	1.75	1.00		1.00	1.00	1.00			2.25	3.00

Bloom's Level	Course Name: Electronics Engineering Workshop (P) Course Code: 22EL505	
L2	CO1	Explain the electrical characteristics and functions of Power Electronics components.
L3	CO2	Apply PCB design principles to fabricate functional circuits.
L4	CO3	Analyze and implement voltage regulators and timer circuits using Op-Amps, LEDs, and ICs.
L5	CO4	Evaluate power diodes, transistors, and Op-Amps using systematic testing and measurement.

	COURSE ARTICULATION MATRIX													
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	2	3	3	2	2	1	1	1	2	2	3
L3	CO2	3	2	3	2	3	2	1	1	2	2	2	1	3
L4	CO3	3	3	2	3	3	2	2	1	2	2	3	1	3
L5	CO4	3	3	2	3	3	2	2	1	1	1	3	2	3
AVERAGE		3.00	2.75	2.25	2.75	3.00	2.00	1.75	1.00	1.50	1.50	2.50	1.50	3.00

Bloom's Level	Course Name: PE I: Electric & Magentic Field (T) Course Code: 22EL511	
L2	CO1	Explain vector analysis in different coordinates for electromagnetic fields
L3	CO2	Apply Coulomb's Law, Gauss's Law, and field equations to analyze electric fields and charge distributions
L4	CO3	Analyze conductors, dielectrics, and magnetic materials under fields to compute capacitance, inductance, and forces.
L5	CO4	Evaluate Maxwell's equations and their applications in time-varying fields, and power flow.

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
		Course Matrix (CO PO Mapping Table)													
L2	CO1	3	3	2	2	2	2	1	1	1	1	2	2	3
L3	CO2	3	3	2	3	2	2	2	1	1	1	2	2	3
L4	CO3	3	3	2	2	3	3	2	1	1	2	3	3	3
L5	CO4	3	3	2	3	3	2	3	1	2	2	3	2	3

Bloom's Level		Course Name: PE I: Electrical Machine Design (T) Course Code: 22EL512
L3	CO1	**Identify** various materials used in construction of electrical machines and find their rating and performance
L5	CO2	**Estimate** the design parameters of transformer
L5	CO3	**Evaluate** stator, rotor design dimensions of induction motor
L6	CO4	**Formulate** the designed parameters of synchronous machine.

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
		Course Matrix (CO PO Mapping Table)													
L3	CO1	3	3	3	3	2	2	1	1	1	1	2	3	2
L5	CO2	3	3	3	3	2	2	1	1	1	1	2	3	2
L5	CO3	3	3	3	3	2	2	1	1	1	1	2	3	2
L6	CO4	3	3	3	3	2	2	1	1	1	1	2	3	2
AVERAGE		3.00	3.00	3.00	3.00	2.00	2.00	1.00	1.00	1.00	1.00	2.00	3.00	2.00

Bloom's Level		Course Name: PE I: Design of Photovoltaic System (T) Course Code: 22EL513
L2	CO1	**Demonstrate** the knowledge and apply key solar electric system concepts.
L5	CO2	Select the Mounting, grounding, positioning and installing the photovoltaic system.
L4	CO3	Examine the performance, operation and maintenance of solar photovoltaic system.
L5	CO4	Design of solar PV Plant with inclusion of costing and safety parameters.

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
		Course Matrix (CO PO Mapping Table)													
L2	CO1	3				2	2	1	1		1	2	2	
L5	CO2	3	2	1	1	2	2	1	1	1		2	1	1

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L4	CO3	3	3	3	2	1	1	1		1	1	1	2	
L5	CO4		3	3	2	2	2	1		2	2	2	2	
AVERAGE		3.00	2.67	2.33	1.67	1.75	1.75	1.00	1.00	1.33	1.33	1.75	1.75	1.00

Bloom's Level	Course Name: PE I: Electric Power Utilization (T) Course Code: 22EL514	
L2	CO1	**Describe** various types of heating and welding methods.
L3	CO2	**Calculate** number of lamps required for Illumination.
L2	CO3	**Discuss** different refrigeration and Air Conditioning systems for various application
L3	CO4	**Explain** various types of fans, pumps, compressor and DG sets along with their application and their performance

	Course Matrix (CO PO Mapping Table)													
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3								3		3
L2	CO2	3	3	3								3		3
L3	CO3	3	3	3								3		3
L4	CO4	3	3	3								3		3
AVERAGE		3.00	3.00	3.00								3.00		3.00

Bloom's Level	Course Name: PE II: Illumination Engineering (MOOC) (T) Course Code: 22EL531	
L2	CO1	**Identify** the criteria for the selection of lamps and lighting systems for an indoor or outdoor space
L3	CO2	**Explain** the different parameters in designing an illumination system for a particular application.
L3	CO3	**Apply** different illumination systems for different applications.
L4	CO4	**Devise** proper illumination model for a specific application.

	Course Matrix (CO PO Mapping Table)													
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	1	1	2	1	1	1		1	2	2
L3	CO2	3	3	3	1	1	2	1	1	1		1	2	2
L3	CO3	3	2	3	1	1	2	1	1	1		1	2	2
L4	CO4	3	3	3	1	1	2	1	1	1		1	2	2
AVERAGE		3.00	2.75	3.00	1.00	1.00	2.00				1.00		1.00	2.00

Bloom's Level	Course Name: PE II: Energy Storage System (T) Course Code: 22EL532	
L2	CO1	Describe the functions of energy storages, their sizing, and applications.
L3	CO2	Explain electrochemical and mechanical energy storage.
L4	CO3	Analyse the function and use of flywheel, fuel cells and hydrogen storage.
L3	CO4	Illustrate battery hybridization, recycling, battery management systems, chargers, testing and mobile storage.

	Course Matrix (CO PO Mapping Table)													
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	2	2	2	1	2	1		3	3	2
L3	CO2	3	3	3	3	2	2	1	2	1		3	3	2
L4	CO3	3	3	3	3	2	2	1	2	1		3	3	2
L3	CO4	3	3	3	3	3	2	1	2	1		3	3	2
AVERAGE		3.00	3.00	3.00	2.75	2.25	2.00	1.00	2.00	1.00		3.00	3.00	2.00

Bloom's Level	Course Name: PE II: Electrical Wiring Estimation and Costing (T) Course Code: 22EL533	
L2	CO1	**Illustrate** Tendering, quotation processes and enabling the use of standardized electrical symbols, SI units.
L6	CO2	**Design** substations and connection schemes & **choose** different cable insulation and materials for earth resistance measurement.
L3	CO3	**Solve** for different conductor size and estimation of H.T. & L.T. overhead lines and underground cables.
L5	CO4	**Estimate** the costing of electrical installations material for residential & workshops buildings.

	Course Matrix (CO PO Mapping Table)													
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	1	1	1	1	1	1	1	1	2	1	3	2
L6	CO2	3	3	3	2	2	1	1	1	1	2	1	3	2
L3	CO3	3	3	2	2	2	1	1	1	1	2	1	3	2
L5	CO4	3	3	2	2	2	1	1	1	1	2	1	3	2
AVERAGE		3.00	2.50	2.00	1.75	1.75	1.00	1.00	1.00	1.00	2.00	1.00	3.00	2.00

Bloom's Level		Course Name: PE II: Distributed Generations in Power System (T) Course Code: 22EL534
L4	CO1	**Classify** the energy sources and its conversion for distributed energy generation
L4	CO2	**Distinguish** Solar Photovoltaic, wind turbine systems and other renewable energy sources
L3	CO3	**Use** of fundamental knowledge of energy storage devices in power system
L5	CO4	**Evaluate** the Performance of power system with respect to power quality

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L4	CO1	3	2	2								3	3	3
L4	CO2	3	3	3	1	1						3	3	3
L3	CO3	3	3	3			2					3	3	3
L5	CO4	3	3	3	3	1						3	3	3
AVERAGE		3.00	2.75	2.75	2.00	1.00	2.00					3.00	3.00	3.00

Bloom's Level		Course Name: OEI: Renewable Energy Generation System (T) Course Code: 22EL551
L2	CO1	**Discuss** types of renewable energy sources, outline as per Global and Indian context
L3	CO2	**Explain** various applications of Solar energy sources and **describe** types of wind turbine generator systems.
L2	CO3	**Review** geothermal and biomass energy resources.
L5	CO4	**Summarize** energy from ocean, tide, wave and hydro for power generation, storage methods for renewable energy sources.

COURSE ARTICULATION MATRIX

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	1		3	1	1	1		1	2	1
L3	CO2	3	3	3	1		3	1	1	1		1	2	1
L2	CO3	3	3	3	1		3	1	1	1		1	2	1
L5	CO4	3	3	3	1		3	1	1	1		1	2	1
AVERAGE		3.00	3.00	3.00	1.00		3.00	1.00	1.00	1.00		1.00	2.00	1.00

Bloom's Level		Course Name: OE III: Solar Power Plant Design and Installation (T) Course Code: 22EL653
L2	CO1	**Classify** different types of solar power plant and system sizing based on load profiles
L2	CO2	**Compare** different types of solar PV panels and inverters for solar power plant.
L3	CO3	**Select** AC and DC cable, earthing and lightening arrestors.
L3	CO4	**Utilize** government policies for solar power plant installation and **select** proper

		operation and maintenance procedures for a solar power plant.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	3	2	2	3	1	1		3	1	3
L2	CO2	3	3	3	3	2	2	3	1	1		3	1	3
L3	CO3	3	3	3	3	2	2	3	1	1		3	1	3
L3	CO4	3	3	3	3	2	2	3	1	1		3	1	3
AVERAGE		3.00	3.00	3.00	3.00	2.00	2.00	3.00	1.00	1.00	#DIV/0!	3.00	1.00	3.00

Bloom's Level		Course Name: OE II: Electrical Energy Audit and Safety (T) Course Code: 22EL571
L2	CO1	**Classify** the consumption pattern, conservation of electrical energy and Electricity Act 2001.
L2	CO2	**Demonstrate** different forms of energy to optimize the use for maximizing the efficiency of system.
L4	CO3	**Examine** the proper utilization of energy by energy management and audit.
L4	CO4	**Analyze** the various Global Environmental Concerns and Electrical safety procedures.

COURSE ARTICULATION MATRIX

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	3	2	2	3	1	1		3	1	3
L2	CO2	3	3	3	3	2	2	3	1	1		3	1	3
L4	CO3	3	3	3	3	2	2	3	1	1		3	1	3
L4	CO4	3	3	3	3	2	3	3	1	1		3	1	3
AVERAGE		3.00	3.00	3.00	3.00	2.00	2.25	3.00	1.00	1.00	#DIV/0!	3.00	1.00	3.00

Bloom's Level		Course Name: OE II: Power System Engineering (T) Course Code: 22EL573
L3	CO1	**Articulate** types of load and power system components and its behaviour.
L3	CO2	**Develop** and **examine** the transmission lines to improve the parameters and safety of the power system.
L4	CO3	**Compare** A.C and D.C distribution networks performance.
L4	CO4	**Select** proper switchgear and protection system and analysis for distribution network.

	COURSE ARTICULATION MATRIX

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L3	CO1	3	2	1			1	1	1	1		1	2	1
L3	CO2	3	2	1	1	1	1	1	1	1		1	2	1
L4	CO3	3	2	1	1	1	1	1	1	1		1	2	1
L4	CO4	3	2	1			1	1	1	1		1	2	1
AVERAGE		3.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	2.00	1.00

VI SEMESTER B.TECH

Bloom's Level	Course Name: Power System Analysis (T) Course Code: 22EL601	
L3	CO1	Apply symmetrical components concepts in fault analysis
L3	CO2	Analyse different faults in power system
L3	CO3	Evaluate stability and economic operation of power system
L2	CO4	Differentiate different neutral grounding and compensation systems

	Course Matrix (CO PO Mapping Table)													
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L3	CO1	3	3		2	2	2		1			3	3	2
L3	CO2	3	3		2	2	2		1			3	3	2
L3	CO3	3	3		2	2	2		1			3	3	2
L2	CO4	3	2		1	1						3	3	2
AVERAGE		3.00	2.75		1.75	1.75	2.00		1.00			3.00	3.00	2.00

Bloom's Level	Course Name: Electric Vehicles (T) Course Code: 22EL602	
L3	CO1	Explain the EV structure, its dynamics and details about the power train and propulsion system.
L2	CO2	Discuss and identify the appropriate battery and its characteristics with various alternating energy sources
L4	CO3	Illustrate and analyze different motors for EV and HEVs with their modelling
L3	CO4	Identify, analyze and formulate various power electronics converter for AC and DC drives and their controls.

	Course Matrix (CO PO Mapping Table)													
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L3	CO1	3	3	3	3	1	2		1	1		2	2	2
L2	CO2	3	3	3	2	1	2		1	1		2	3	2
L4	CO3	3	3	3	2	1	2		1	1		2	3	2
L3	CO4	3	3	3	2	1	1		1	1		2	3	3
AVERAGE		3.00	3.00	3.00	2.25	1.00	1.75		1.00	1.00		2.00	2.75	2.25

Bloom's Level	Course Name: Electric Vehicles (P) Course Code: 22EL603	
L2	CO1	Interprete the configuration and operation of BLDC motor.
L2	CO2	Demonstrate the operation of PMDC motor.

L2	CO3	Illustrate the operation of Plug-in Electric Vehicle Charging System.
L3	CO4	Develop the simulation model of bidirectional dc to dc converter.

Bloom's Level		Course Matrix (CO PO Mapping Table)												
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	3	3	1	1	1	1		2	2	3
L2	CO2	3	3	3	2	3	1	1	1	1		2	2	3
L2	CO3	3	3	3	2	3	1	1	1	1		2	2	3
L3	CO4	3	3	3	2	3	1	1	1	1		2	2	3
AVERAGE		3.00	3.00	3.00	2.25	3.00	1.00	1.00	1.00	1.00		2.00	2.00	3.00

Bloom's Level		Course Name: Simulation in Power Electronics & Power System (P) Course Code: 22EL604
L2	CO1	Understand the fundmentals of simulation environment of MATLAB/SIMULINK software
L2	CO2	Describe MATLAB/SIMULINK as a tool to solve power system and power electronics problems
L4	CO3	Develop simulation models in power system and analyze the performance
L4	CO4	Make use of SIMULINK to build and analyse models of power electronics

Bloom's Level		Course Matrix (CO PO Mapping Table)												
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
	CO1	3	2	2	2	3	1	1		1		2	3	2
	CO2	3	2	2	2	3	1	1		1		2	3	2
	CO3	3	2	2	2	3	1	1		1		2	3	2
	CO4	3	2	2	2	3	1	1		1		2	3	2
AVERAGE		3.00	2.00	2.00	2.00	3.00	1.00	1.00	#DIV/0!	1.00	#DIV/0!	2.00	3.00	2.00

Bloom's Level		Course Name: Substation Design (P) Course Code: 22EL605
L2	CO1	Explain single line diagram of substation with rating of different equipments, types of relays required and their settings.
L3	CO2	Construct plan of equipment's and panels mounted in a substation
L4	C03	Analyze earthing system of substation.
L6	CO4	Design of substation complete in regards to selection of equipments, sizes, protective schemes and earthing system.

	Course Matrix (CO PO Mapping Table)													
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	2	3	1	2	2	1	1	2	2	2	3	2
L3	CO2	3	2	2	1	2	1	1	1	2	2	2	3	2
L4	CO3	3	3	3	2	2	1	1	1	2	2	2	3	2
L6	CO4	3	3	3	2	2	1	1	1	2	2	2	3	2
AVERAGE		3.00	2.50	2.75	1.50	2.00	1.25	1.00	1.00	2.00	2.00	2.00	3.00	2.00

Bloom's Level		Course Name: PE III: Electrical Installation Design (T) Course Code: 22EL611
L2	CO1	**Classify** the techniques used to identify the load pattern.
L2	CO2	**Explain** various types of wires, cables used in distribution systems and their tests.
L3	CO3	**Identify** different types of luminaries and develop calculation skills.
L4	CO4	**Analyze** various components involved in substation and their functions.

	Course Matrix (CO PO Mapping Table)													
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	3	2	1	3	1	1		3	3	2
L2	CO2	3	3	3	3	2	1	3	1	1		3	3	2
L3	CO3	3	3	3	3	2	1	3	1	1		3	3	2
L4	CO4	3	3	3	3	2	1	3	1	1		3	3	2
AVERAGE		3.00	3.00	3.00	3.00	2.00	1.00	3.00	1.00	1.00	#DIV/0!	3.00	3.00	2.00

Bloom's Level		Course Name: PE III: Electrical Installation Design (P) Course Code: 22EL612
L2	CO1	**Interpret** the salient features of National Electrical Code and other relevant national standards applicable for electrical installations in India.
L3	CO2	**Develop** detailed wiring diagram for house building electrification.
L3	CO3	**Identify** the system and equipment earthing as per IS3043
L4	CO4	**Categorize** various types of substations,their ratings and equipments used.

	Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	3	2	2	3	1	1	2	3	3	3
L2	CO2	3	3	3	3	2	2	3	1	1	2	3	3	3
L3	CO3	3	3	3	3	2	2	3	1	1	2	3	3	3
L4	CO4	3	3	3	3	2	2	3	1	1	2	3	3	3
AVERAGE		3.00	3.00	3.00	3.00	2.00	2.00	3.00	1.00	1.00	2.00	3.00	3.00	3.00

Bloom's Level		Course Name: PE III: Electrical Energy Audit and Safety Analysis (T) Course Code: 22EL613
L2	CO1	**Explain**, the energy sources, methods of energy conservation and its pattern, electricity act 2003
L2	CO2	**Interpret** different forms of electrical and thermal energy
L4	CO3	**Examine** the Energy Management, Energy Audit, Energy Monitoring and Targeting
L5	CO4	**Determine** the performance evaluation of Electric motors and drivesand testing procedure, and Electrical safety procedures

		Course Matrix (CO PO Mapping Table)												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	3	3	1	1	1	1	3	3	3	3
L2	CO2	3	3	3	3	3	1	1	1	1	3	3	3	3
L4	CO3	3	3	3	3	3	1	1	1	1	3	3	3	3
L5	CO4	3	3	3	3	3	1	1	1	1	3	3	3	3
AVERAGE		3.00	3.00	3.00	3.00	3.00	1.00	1.00	1.00	1.00	3.00	3.00	3.00	3.00

Bloom's Level		Course Name: PE III: Electrical Energy Audit and Safety Analysis (P) Course Code: 22EL614
L3	CO1	**Identify** the lux level and power consumption using energy meter
L4	CO2	**Examine** Phase sequence, characteristics of synchronous generator, Types of Earthing
L5	CO3	**Measure** Energy Consumption and Measurement of Harmonics
L5	CO4	**Explain** Electrical Shock, Fire Safety and efficiency evaluation of solar panels.

		Course Matrix (CO PO Mapping Table)												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L3	CO1	3	3	3	3	2	1	1	1	1	3	3	3	3
L4	CO2	3	3	3	3	2	2	1	1	1	3	3	3	3

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L5	CO3	3	3	3	3	3	2	1	1	1	3	3	3	3
L5	CO4	3	3	3	3	2	2	1	1	1	3	3	3	3
AVERAGE		3.00	3.00	3.00	3.00	2.25	1.75	1.00	1.00	1.00	3.00	3.00	3.00	3.00

Bloom's Level		Course Name: PE III:Computer Methods in Power System (T) Course Code: 22EL615
L3	CO1	**Compute** different Matrices using graph theory
L3	CO2	**Make use of** different methods **for** Load Flow studies
L4	CO3	**Analyze** the system for different types of faults
L4	CO4	**Deduce** different methods for Transient Stability Studies.

		Course Matrix (CO PO Mapping Table)												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L3	CO1	3	1	2	2	1		1	1	1		1	3	
L3	CO2	3	1	2	1	1	1	1	1	1		1	3	
L4	CO3	3	1	2	1	1	1	1	1	1		1	3	
L4	CO4	3	1	1	1	1	1	1	1	1		1	3	
AVERAGE		3.00	1.00	1.75	1.25	1.00	1.00	1.00	1.00	1.00		1.00	3.00	

Bloom's Level		Course Name: PE III:Computer Methods in Power System (P) Course Code: 22EL616
L2	CO1	**Understand** the main features and importance of the MATLAB/ SCI LAB mathematical programming environment.
L2	CO2	**Interpret** and visualize simple mathematical functions and operations thereon using plots/display.
L3	CO3	**Apply** programing knowledge to edit compile, debug, correct, recompile and run.
L2	CO4	**Interpret** Evaluate, analyze and plot results.

		Course Matrix (CO PO Mapping Table)												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	2		2		3		1	2			1	2	
L2	CO2	2	1	2		3		1	2	2		1	2	
L3	CO3	2	1	2		3		1	2	2		1	2	
L2	CO4	2	1	2		3		1	2	2		1	2	
AVERAGE		2.00	1.00	2.00	#DIV/0!	3.00	#DIV/0!	1.00	2.00	2.00	#DIV/0!	1.00	2.00	#DIV/0!

Bloom's Level	Course Name: PE III: Project Planning and Management (T) Course Code: 22EL617	
L2	CO 1	**Describe** the methodologies involved in project planning and various project planning tools.
L4	CO 2	**Analyze** the project cost and the risk involved in project execution.
L4	CO 3	**Survey** the material handling and earth moving equipments.
L3	CO 4	**Record** the documents and formats involved in project execution and its control.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	1	1	1	1	1	1	2	2	1	2
L4	CO2	3	3	3	2	1	1	1	2	1	2	2	1	2
L4	CO3	3	3	3	2	2	1	1	2	1	2	2	1	2
L3	CO4	3	3	3	2	2	1	1	2	1	2	2	1	2
AVERAGE		3.00	3.00	3.00	1.75	1.50	1.00	1.00	1.75	1.00	2.00	2.00	1.00	2.00

Bloom's Level	Course Name: PE III: Project Planning and Management (P) Course Code: 22EL618	
L2	CO1	**Contrast** the main features and importance of the MS Project environment.
L3	CO2	**Develop** Barchart,Gantt chart,Milestone chart.
L3	CO3	**Prepare** Project Reoprt of Project Planning.
L3	CO4	**Establish** CPM and PERT Project Planning Tools.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	1	1	1	1	1	1	2	2	1	2
L3	CO2	3	3	3	2	1	1	1	2	1	2	2	1	2
L3	CO3	3	3	3	2	2	1	1	2	1	2	2	1	2
L3	CO4	3	3	3	2	2	1	1	2	1	2	2	1	2
AVERAGE		3.00	3.00	3.00	1.75	1.50	1.00	1.00	1.75	1.00	2.00	2.00	1.00	2.00

Bloom's Level	Course Name: PE IV: Advanced Power Electronics (T) Course Code: 22EL631	
L2	CO1	**Demonstrate** the performance of power semiconductor devices and to use these devices in power electronic converters
L6	CO2	Have an in-depth understanding of the methodologies to **design** power electronic converters suitable for DC/DC and DC/AC power conversion
L3	CO3	**Understand**, and **apply** modulation schemes for the DC/AC two level and multilevel inverters.
L3	CO4	**Illustrate** the knowledge of the causes, and effects of harmonics and **apply** suitable mitigation techniques such as passive and active power filters.

| | | | Course Matrix (CO PO Mapping Table) | | | | | | | | | | | | |

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3			1			1	1	1		2	1	3
L6	CO2	3	2	2	1	1		1	1	1		2	3	3
L3	CO3	3	2	2	1	1		1	1	1		2	3	3
L3	CO4	3	2	2	1	1		1	1	1		2	3	2
AVERAGE		3.00	2.00	2.00	1.00	1.00	#DIV/0!	1.00	1.00	1.00	#DIV/0!	2.00	2.50	2.75

Bloom's Level	Course Name: PE IV: Advanced Electrical Drives (T) Course Code: 22EL632	
L2	CO1	**Explain** the dynamics, control schemes, four-quadrant operation of electric drives and energy conservation.
L4	CO2	**Analyze** controlled rectifier-fed and chopper-controlled D.C. drives and battery-powered drives.
L3	CO3	**Apply** the control for asynchronous and synchronous motors, stepper motor.
L5	CO4	**Evaluate** semiconductor-controlled DC and AC traction systems.

| | | | Course Matrix (CO PO Mapping Table) | | | | | | | | | | | | |

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	2	2	1	2	1	1	1		2	2	3
L4	CO2	3	3	3	3	2	2	1	1	1		2	2	3
L3	CO3	3	3	3	3	3	2	1	1	1		2	2	3
L5	CO4	3	3	3	3	2	3	1	1	1		3	2	3
AVERAGE		3.00	3.00	2.75	2.75	2.00	2.25	1.00	1.00	1.00	#DIV/0!	2.25	2.00	3.00

Bloom's Level		Course Name: PE IV: Grid Integration in Renewable Energy Systems (T) Course Code: 22EL633
L2	CO1	**Explain** the need of integrating large renewable energy sources in the existing power system.
L3	CO2	**Identify** components required for grid connected Solar and Wind Energy Conversion System.
L3	CO3	**Select** appropriate renewable energy policies for solar PV installation.
L4	CO4	**Analyze** the impacts of renewable energy integration on grid and environment.

		Course Matrix (CO PO Mapping Table)											
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	3	1	1	1	1	1		3	3	2
L3	CO2	3	3	3	3	1	1	1	1	1		3	3	2
L3	CO3	3	3	3	3	1	1	1	1	1		3	3	2
L4	CO4	3	3	3	3	1	2	1	1	1		3	3	2
AVERAGE		3.00	3.00	3.00	3.00	1.00	1.25	1.00	1.00	1.00	#DIV/0!	3.00	3.00	2.00

Bloom's Level		Course Name: PE IV: Microgrid (T) Course Code: 22EL635
L2	CO1	**Review** various distributed generation systems.
L3	CO2	**Explain** the concept of distributed generation, renewable DG technologies and energy storage systems.
L3	CO3	**Examine** the operational benifits of grid connected renewable distributed DG systems and technical aspects of DGs on grid.
L4	CO4	**Analyze** the operational control, protection and modelling of microgrid.

		Course Matrix (CO PO Mapping Table)											
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	2	1			1	2	1	1		1	1	1
L3	CO2	3	2	2		2	1	2	1	1		1	2	1
L3	CO3	3	2	2	2	2	1	2	1	1		1	2	1
L4	CO4	3	3	3	2	2	1	2	1	1		1	2	1
AVERAGE		3.00	2.25	2.00	2.00	2.00	1.00	2.00	1.00	1.00	#DIV/0!	1.00	1.75	1.00

Bloom's Level	Course Name: OE III: Renewable Energy Generations System (T) Course Code: 22EL651

	CO 1		
L2	CO 1	**Discuss** types of renewable energy sources, outline as per Global and Indian context	
L3	CO 2	**Explain** various applications of Solar energy sources and **describe** types of wind turbine generator systems.	
L2	CO 3	**Review** geothermal and biomass energy resources.	
L5	CO 4	**Summarize** energy from ocean, tide, wave and hydro for power generation, storage methods for renewable energy sources.	

		Course Matrix (CO PO Mapping Table)											
Bloom's Level		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
L2	CO1	3	3	3	1		3	1	1	1		1	2	1
L3	CO2	3	3	3	1		3	1	1	1		1	2	1
L2	CO3	3	3	3	1		3	1	1	1		1	2	1
L5	CO4	3	3	3	1		3	1	1	1		1	2	1
AVERAGE		**3.00**	**3.00**	**3.00**	**1.00**	**#DIV/0!**	**3.00**	**1.00**	**1.00**	**1.00**	**#DIV/0!**	**1.00**	**2.00**	**1.00**

Bloom's Level	Course Name: OE III: Solar Power Plant Design and Installation (T) Course Code: 22EL653		
L2	CO 1	**Classify** different types of solar power plant and system sizing based on load profiles	
L2	CO 2	**Compare** different types of solar PV panels and inverters for solar power plant.	
L3	CO 3	**Select** AC and DC cable, earthing and lightening arrestors.	
L3	CO 4	**Utilize** government policies for solar power plant installation and **select** proper operation and maintenance procedures for a solar power plant.	

		Course Matrix (CO PO Mapping Table)											
Bloom's Level		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
L2	CO1	3	3	3	3	2	2	3	1	1		3	1	3
L2	CO2	3	3	3	3	2	2	3	1	1		3	1	3
L3	CO3	3	3	3	3	2	2	3	1	1		3	1	3
L3	CO4	3	3	3	3	2	2	3	1	1		3	1	3
AVERAGE		**3.00**	**3.00**	**3.00**	**3.00**	**2.00**	**2.00**	**3.00**	**1.00**	**1.00**	**#DIV/0!**	**3.00**	**1.00**	**3.00**

Bloom's Level	Course Name: OE IV: Electrical Energy Audit and Safety (T) Course Code: 22EL671

Bloom's Level		CO	Description
L2		CO1	**Classify** the consumption pattern, conservation of electrical energy and Electricity Act 2001.
L2		CO2	**Demonstrate** different forms of energy to optimize the use for maximizing the efficiency of system.
L4		CO3	**Examine** the proper utilization of energy by energy management and audit.
L4		CO4	**Analyze** the various Global Environmental Concerns and Electrical safety procedures.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	3	2	2	3	1	1		3	1	3
L2	CO2	3	3	3	3	2	2	3	1	1		3	1	3
L4	CO3	3	3	3	3	2	2	3	1	1		3	1	3
L4	CO4	3	3	3	3	2	3	3	1	1		3	1	3
AVERAGE		3.00	3.00	3.00	3.00	2.00	2.25	3.00	1.00	1.00	#DIV/0!	3.00	1.00	3.00

Bloom's Level		CO	**Course Name: OE IV: Power System Engineering (T) Course Code: 22EL673**
L3		CO1	**Articulate** types of load and power system components and its behaviour.
L3		CO2	**Develop** and **examine** the transmission lines to improve the parameters and safety of the power system.
L4		CO3	**Compare** A.C and D.C distribution networks performance.
L4		CO4	**Select** proper switchgear and protection system and analysis for distribution network.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L3	CO1	3	2	1			1	1	1	1		1	2	1
L3	CO2	3	2	1	1	1	1	1	1	1		1	2	1
L4	CO3	3	2	1	1	1	1	1	1	1		1	2	1
L4	CO4	3	2	1			1	1	1	1		1	2	1
AVERAGE		3.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	#DIV/0!	1.00	2.00	1.00

VII SEMESTER B.TECH

Bloom's Level	Course Name: Switchgear and Protection (T) Course Code: EL2401 [PSP SRG]	
L2	CO1	Explain the various basic principles of protection system.
L4	CO2	Illustrate overcurrent and distance protection schemes.
L2	CO3	Classify and select the different types of circuit breakers.
L3	CO4	Choose various protection schemes used for Electrical Equipments.

	Course Matrix (CO PO Mapping Table)												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	1	1			1	1	1	1		1	3	1
L4	CO2	3	3	3	3		2	1	1	1		1	3	2
L2	CO3	3	3	3	1		2	1	1	1		1	3	2
L3	CO4	3	3	2	3		1	1	1	1		1	3	2
AVERAGE		3.00	2.50	2.25	2.33		1.50	1.00	1.00	1.00	#DIV/0!	1.00	3.00	1.75

Bloom's Level	Course Name: Switchgear and Protection (P) Course Code: EL2402 [PSP SRG]	
L4	CO1	Test electromechanical overcurrent relay.
L3	CO2	Employ various distance protection scheme and draw its opearing characteristics.
L3	CO3	Develop protection scheme for transformer.
L3	CO4	Illustrate the performance of digital protection relays.

	Course Matrix (CO PO Mapping Table)												
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L4	CO1	1	2	1	2	1	2	1	2	2		2	2	2
L3	CO2	3	2	1	2	1	2	1	2	2		2	2	2
L3	CO3	2	2	1	2	2	2	1	2	2		2	2	2
L3	CO4	3	2	1	2	2	2	1	2	2		2	2	2
AVERAGE		2.25	2.00	1.00	2.00	1.50	2.00	1.00	2.00	2.00		2.00	2.00	2.00

Bloom's Level	Course Name: High Voltage Engineering (T) Course Code: EL2403 [BSS TDT]	
L2	CO1	Explain various breakdown mechanism and overvoltages
L3	CO2	Identify propagation of travelling waves along with insulation coordination
L4	CO3	Analyze generation and measurement of high voltage and current.
L5	CO4	Evaluate Non-destructive and high voltage testing of electrical apparatus

	Course Matrix (CO PO Mapping Table)												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	2	2	2	1	1	1	1	1	2	3	2
L3	CO2	3	3	2	2	2	1	1	1	1	2	2	3	2

Bloom's Level													
L4	CO3	3	3	3	2	2	2	1	1	1	3	2	3	2
L5	CO4	3	3	3	2	3	2	1	1	1	3	2	3	2
AVERAGE		3.00	3.00	2.50	2.00	2.25	1.50	1.00	1.00	1.00	2.25	2.00	3.00	2.00

Bloom's Level		Course Name: High Voltage Engineering (P) Course Code: EL2404 [BSS TDT]
L2	CO1	Demonstrate High voltage equipment and its rating in laboratory
L4	CO2	Test for breakdown voltage, resitivity, dielectric constant and tan delta of Transformer oil.
L5	CO3	Measure breakdown voltage of dielectric medium.
L5	CO4	Determine high voltage AC, DC or Impulse Voltage.

	Course Matrix (CO PO Mapping Table)												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L3	CO1	3	3	3	3	1	1	1	1	1	1	2	3	2
L4	CO2	3	3	3	3	3	1	1	1	1	3	2	3	2
L5	CO3	3	3	3	3	3	2	1	1	1	3	2	3	2
L5	CO4	3	3	3	3	3	1	1	1	1	3	2	3	2
AVERAGE		3.00	3.00	3.00	3.00	2.50	1.25	1.00	1.00	1.00	2.50	2.00	3.00	2.00

Bloom's Level		Course Name: PE II : Fundamentals of Power Quality (T) Course Code: EL2411 [PMM]
L2	CO1	Classify different various power quality problems and identify their causes, effects, and solutions.
L4	CO2	Analyse and evaluate the voltage sag in power system.
L4	CO3	Explain the fundamentals of harmonics and select suitable solutions through filters for harmonics mitigation
L4	CO4	Plan of mitigating the power quality events through custom power and network configuring devices and apply suitable control strategies.

	Course Matrix (CO PO Mapping Table)												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	1	1	1			2	2	2		1	3	1
L4	CO2	3	3	3	2			2	2	2		1	3	2
L4	CO3	3	3	3	2	1		2	2	2		1	3	2

L4	CO4	3	2	2	2	1		2	2	2		1	3	2
AVERAGE		3.00	2.25	2.25	1.75				2.00				3.00	1.75

Bloom's Level	Course name: PE II:Electrical Installtion Design Course Code: EL2412 [PBJ]	
L2	CO1	**Interpret** the salient features of National Electrical Code and other relevant national standards applicable for electrical installations in India.
L3	CO2	**Develop** detailed wiring diagram for house building electrification.
L3	CO3	**Identify** the system and equipment earthing as per IS3043
L4	CO4	**Categorize** various types of substations,their ratings and equipments used.

	Program Matrix (CO PO Mapping Table)													
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3	3	3	2	2	3	1	1	2	3	3	3
L2	CO2	3	3	3	3	2	2	3	1	1	2	3	3	3
L3	CO3	3	3	3	3	2	2	3	1	1	2	3	3	3
L4	CO4	3	3	3	3	2	2	3	1	1	2	3	3	3
AVERAGE		3.00	3.00	3.00	3.00	2.00	2.00	3.00	1.00	1.00	2.00	3.00	3.00	3.00

Bloom's Level	Course Name: PE II: Power System Operation and Control (T) Course Code: EL2421 [SBR]	
L3	CO1	**Calculate** various factors & reserve requirement for economic aspects of power system.
L4	CO2	**Evaluate** optimal unit committment ,load forecasting problem & optimal scheduling of generating unit
L3	CO3	**Explain** the concept of Single area load frequency control.
L3	CO4	**Write** various methods of voltage control,reactive power compensation

	Course Matrix (CO PO Mapping Table)													
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2

Bloom's Level	CO	PO1	PO2	PO3										PSO1	PSO2
L3	CO1	3	2	2										3	3
L4	CO2	3	2	2										3	3
L3	CO3	3	1	1										1	1
L3	CO4	3	2	2										1	1
AVERAGE		3.00	1.75	1.75										2.00	2.00

Bloom's Level		Course Name: PE II: Microgrid (T) Course Code: EL2429 [GCG]
	CO1	Find the type, size and optimal placement of DG and storage systems.
	CO2	Analyze the impact of DGs grid integration and its control aspects.
	CO3	Describe the operational impacts and performance analysis of DGs connected to integrated power systems.
	CO4	Analyze the microgrid taking into consideration the operational and control issues of the DGs.

		Course Matrix (CO PO Mapping Table)												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
	CO1													
	CO2													
	CO3													
	CO4													
AVERAGE		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!	

Bloom's Level	Course Name: PE III: FACTS Devices (T) Course Code: EL2422 [SPG]

Bloom's Level		
L2	CO1	**Explain** FACTS Concept, various FACTS Controllers, its classification and applications in Transmission system.
L3	CO2	**Apply** different shunt and series compensators and its control schemes
L4	CO3	**Analyze** voltage and phase angle regulators in power system
L5	CO4	**Evaluate** the improved transmission system performance using combine series-shunt and series-series controllers.

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	1	1	1	1		1	1	2		3	2	2
L3	CO2	3	3	3	3	2		1	1	2		3	3	3
L4	CO3	3	3	3	3	2		1	1	2		3	3	3
L5	CO4	3	3	3	3	2		1	1	2		3	3	3
AVERAGE		3.00	2.50	2.50	2.50	1.75		1.00	1.00	2.00		3.00	2.75	2.75

Bloom's Level		Course name: PEIII: Electrical Energy Management and Audit Course Code: EL2423 [SDP]
L2	CO1	**Classify** the energy sources, methods of energy conservation and its pattern, electricity act 2003.
L3	CO2	**Apply** different forms of electrical and thermal energy for power generation
L5	CO3	**Evaluate Energy Management, Energy Audit, Energy Monitoring and Targeting for better performance of power system**
L4	CO4	**Analyze** the Performance of Electric Motor and variable Speed drives with captive power plants and cogeneration systems

Program Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	2	2	2	1						3	3	2
L3	CO2	3	2	2	2	2	2					3	3	2
L5	CO3	3	2	2	2	2	1			3	2	3	3	2
L4	CO4	3	2	2	2	2						3	3	2
AVERAGE		3.00	2.00	2.00	2.00	1.75	1.50	#DIV/0!	#DIV/0!	3.00	2.00	3.00	3.00	2.00

Bloom's Level		Course Name: PE III: Advanced Control System (T) Course Code: EL2424 [SRG]
L4	CO1	Develop lag and lead compensator design and explain controllers in time and frequency domain.
L4	CO2	Analyse the performance of linear control system using state variable approach and design state variable feedback
L4	CO3	Classify and explain the characteristics of non-Linear Control Systems and access its performance
L4	CO4	Explain sampled data control system and infer stability using Z-transforms

		Course Matrix (CO PO Mapping Table)												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L6	CO1	3	3	1	2	2		1	1	1	1	1	1	3
L3	CO2	3	3	1	2	2		1	1	1	1	1	1	3
L4	CO3	3	3	1	2	2		1	1	1	1	1	1	3
L4	CO4	3	3	1	2	2		1	1	1	1	1	1	3
AVERAGE		3.00	3.00	1.00	2.00	2.00			1.00					1.00	3.00

Bloom's Level		Course Name: PE III: Artificial Intelligence based Systems (T) Course Code: EL2425 [SSG]
L1	CO1	Recall, explain, solve and analyse the principles of fuzzy logic and control.
L2	CO2	Explain and discuss adaptive fuzzy control.
L3	CO3	Explain, analyse and solve problems in basic neural networks and associative memories
L4	CO4	Explain, analyse and solve problems on recurrent networks and neural control.

		Course Matrix (CO PO Mapping Table)												
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L1	CO1	3	2	1	2	1	1	1	1	1		1	1	1
L2	CO2	3	2	1	1	1	1	1	1	1		1	1	1
L3	CO3	3	2	1	2	1	1	1	1	1		1	1	1
L4	CO4	3	2	1	2	2	1	1	1	1		1	1	1
AVERAGE		3.00	2.00	1.00	1.75	1.25								1.00	1.00

Bloom's Level		Course Name: PE IV: Advanced Electrical Drives (T) Course Code: 22EL632 [SGK]
2	CO1	Understand the dynamics, control schemes, energy conservation, and four-quadrant operation of electric drives.
3	CO2	Design and analyze controlled rectifier-fed, chopper-controlled D.C. drives, and advanced control techniques like V/f and vector control for induction motors.
4	CO3	Explore starting, braking, and control of synchronous motors, along with advanced drives like brushless DC, stepper, and solar-powered systems.
5	CO4	Evaluate DC and AC traction systems, including semiconductor-controlled drives and their application in transportation systems.

		Course Matrix (CO PO Mapping Table)											
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
	CO1	3	3	2	2	1	2	0	1	1		2	3	2
	CO2	3	3	3	3	2	2	0	1	1		2	3	3
	CO3	3	2	3	3	3	2	0	1	1		2	2	3
	CO4	3	2	3	3	2	3	1	1	1		3	2	2
AVERAGE		3.00	2.50	2.75	2.75	2.00	2.25	0.25	1.00	1.00		2.25	2.50	2.50

Bloom's Level		Course Name: PE IV: Fundamentals of Smart Grid (T) Course Code: EL2432 [RMM]
L2	CO1	Compare conventional and smart grid and illustrate role of stake holders and functions of smart grid.
L3	CO2	Identify components and computational tools for smooth functioning of smart

		grid.												
L5	CO3	Determine the performance of smart grid based on congestion, security and contingency studies for optimal solutions.												
L6	CO4	Discuss designing of smart grid with options like automation, sustainable energy and storage.												

	Course Matrix (CO PO Mapping Table)													
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1	3	3			2	1	1		1	1	2	1	
L3	CO2	3		2		2			1	1		2		2
L5	CO3		3	3	3	2	2	1	1	1	1	2	2	2
L6	CO4		3	3	3	3	1	1	2	1	1	2	2	2
AVERAGE		3.00	3.00	2.67	3.00	2.25	1.33	1.00	1.33	1.00	1.00	2.00	1.67	2.00

Bloom's Level	Course Name: PE IV: Computer Methods in Power System (T) Course Code: EL2433 [PSP]	
L3	CO1	**Compute** different Matrices using graph theory
L3	CO2	**Make use of** different methods for Load Flow studies
L4	CO3	**Analyze** the system for different types of faults
L4	CO4	**Deduce** different methods for Transient Stability Studies.

	Course Matrix (CO PO Mapping Table)													
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L3	CO1	3	1	2	2	1		1	1	1		1	3	
L3	CO2	3	1	2	1	1	1	1	1	1		1	3	
L4	CO3	3	1	2	1	1	1	1	1	1		1	3	
L4	CO4	3	1	1	1	1	1	1	1	1		1	3	
AVERAGE		1.00	1.00	1.75		1.00		1.00	1.00			1.00	2.00	1.00

Bloom's Level		Course Name: PE IV: Project Planning (T) Course Code: EL2436 [PBJ]													
L2	CO1	**Describe** the methodologies involved in project planning and various project planning tools.													
L4	CO2	**Analyze** the project cost and the risk involved in project execution.													
L4	CO3	**Survey** the material handling and earth moving equipments.													
L3	CO4	**Record** the documents and formats involved in project execution and its control.													

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L2	CO1 3 3 3 1 1 1 1 2 2 1 1	3	3	3	1	1	1	1	1	1	2	2	1	2
L4	CO2 3 3 3 2 1 1 1 2 2 1 1	3	3	3	2	1	1	1	2	1	2	2	1	2
L4	CO3 3 3 3 2 2 1 2 2 1 2	3	3	3	2	2	1	1	2	1	2	2	1	2
L3	CO4 3 3 3 2 2 1 1 2 2 2 2	3	3	3	2	2	1	1	2	1	2	2	1	2
AVERAGE		**3.00**	**3.00**	**3.00**			**1.00**						**1.00**	**2.00**

Bloom's Level		Course Name: Mini Project (P) Course Code: EL2409 [ASL]
L1	CO1	**Identify** the research area of project work in Electrical Engineering.
L2,L6	CO2	**Summarize** the literature review in the area identified, propose the objectives of project work.
L3,L4	CO3	**Organize** requisite components with specifications for the project software/hardware prototype and apply suitable software/hardware tool in project work
L2,L5,L6	CO4	**Compile** project work to prepare a thesis report and present a research paper on project

Course Matrix (CO PO Mapping Table)

Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L1	CO1	3	3	3	3	3	3	3	3	3	3	3	3	3
L2,L6	CO2	3	3	3	3	3	3	3	3	3	3	3	3	3
L3,L4	CO3	3	3	3	3	3	3	3	3	3	3	3	3	3
L2,L5,L6	CO4	3	3	3	3	3	3	3	3	3	3	3	3	3

AVERAGE	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Bloom's Level	Course Name: Campus Recrutment Training (CRT) (P) Course Code: EL2410 [RSK]
L4	CO1 Analytical skill improvement of logical reasoning for professional responsibilities.
L3	CO2 Develop communication, overall personality.

			Course Matrix (CO PO Mapping Table)										
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
Analyzing	CO1	1	2	2	2			1	2				2	
Applying	CO2									2			1	
AVERAGE		1.00	2.00	2.00	2.00			1.00	2.00	2.00			1.50	

VIII SEMESTER B.TECH

Bloom's Level		Course Name: Major Project Course Code: EL2451 [ASL]
L1	CO1	**Identify** the research area of project work in Electrical Engineering.
L2,L6	CO2	**Summarize** the literature review in the area identified, propose the objectives of project work.
L3,L4	CO3	**Organize** requisite components with specifications for the project software/hardware prototype and apply suitable software/hardware tool in project work
L2,L5,L6	CO4	**Compile** project work to prepare a thesis report and present a research paper on project

		Course Matrix (CO PO Mapping Table)										
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
L1	CO1	3	3	3	3	3	3	3	3	3	3	3	3	3
L2,L6	CO2	3	3	3	3	3	3	3	3	3	3	3	3	3
L3,L4	CO3	3	3	3	3	3	3	3	3	3	3	3	3	3
L2,L5,L6	CO4	3	3	3	3	3	3	3	3	3	3	3	3	3
AVERAGE		3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Bloom's Level		Course Name: Extra curricular Activity Evaluation Course Code: EL2452 [NTS]
L3	CO1	Build his/her hobbies and interests
L6	CO2	Discuss and work in team
L6	CO3	Develop the sense of responsibility

Course Matrix (CO PO Mapping Table)														
Bloom's Level		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1
	CO1						1						3	
	CO2						2			3	3	3		
	CO3						3		3				3	
AVERAGE							2.00		3.00	3.00	3.00	3.00		