Madhav Institute of Technology & Science Gwalior-5

ELECTRICAL ENGG.																							
Year	2017-2021			CO Attainment			CO-PO Matrix																
			Course Outcome	Direct % Attainment	Indirect % Attainment	Total % Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
semester 3	100001: Engineering Mathematics II	CO1	Retrieve the engineering application problems to related course content	2.1	2.0	2.09	2	2	3	2	2		2					2	2	2
		CO2	Describe the basic concept of Complex Variable , Linear Programming Problem and Numerical Methods	2.2	2.0	2.16	2	2	2	2	2		3					2	2	2
		CO3	Classify Complex Variable , Linear Programming Problem and Numerical Methods so as to apply the knowledge in solving routine problems	2.6	2.1	2.51	2	2	3	3	2							2	2	2
		CO4	Inculcate analytical and computational skill to interpret the topics for engineering problems	2.3	1.9	2.23	2	2	3	3	2								2	2
		CO5	Analyze the Complex Variable, Linear Programming Problem and Numerical Methods to examine the real world problem	2.3	2.0	2.24	2	2	2	2	2								2	2
		CO6	Evaluate and Implement suitable techniques relevant for industries and contribute to the society	1.8	1.9	1.81	2	2	2	2	2								2	2
			100001: Engineering Mathematics II																				
	130301: Electro Magnetic Field Theory	CO1	Write and interpret Maxwell's equations in differential and integral forms, both in time and frequency domains.	2.9	2.2	2.8	3	3	3						1				2	
		CO2	Define complex permittivity, permeability, conductivity and perfect electric and perfect magnetic conductors.	2.7	2.1	2.6	3	3	3						1				2	
		CO3	Derive Poyntings theorem from Maxwells equations and interpret the terms in the theorem physically.	2.3	2.0	2.2	3	3	3						2				2	
		CO4	Apply vector calculus to understand the behavior of static electric fields in standard configurations	2.9	1.9	2.7	3	3	3						2				2	

	CO5	Identify, formulate, and solve engineering problems of Electromagnetic, Electrostatic and Magnetic to Static circuits using Basic relations	2.9	1.9	2.7	3	3	3						2				2	
	CO6	Formulate and solve engineering problems of Electromagnetic.	2.3	1.9	2.2	3	3	3						2				2	
		130301: Electro Magnetic Field Theory																	
130302: Measurement & Instrumentation	CO1	Explain the basic concepts of electrical and electronic measurement and measuring instruments.	2.7	2.0	2.6	3	3	3					1	1	1	2		2	
	CO2	Determine errors in a measurement system.	2.7	2.0	2.6	3	3		2		2		2	1	1	2	1		
	CO3	Describe the construction and working of AC and DC bridges and their applications	2.6	2.1	2.5	3	3						1	1	1				
	CO4	Select suitable measuring instrument, signal Generator, frequency counter, CRO and digital IC tester for appropriate measurement	2.7	1.9	2.5	3		3	3	2			1	1	1				
	CO5	Select appropriate passive, active transducers and A/D & D/A converters for measurement of physical quantity.	3.0	2.0	2.8	3	3		3	2			1	1	1	1	1		2
	CO6	Describe working principle of CT & PT and their applications	1.8	1.9	1.8	3		3	3	2			1	2	1	1			
		130302: Measurement & Instrumentation																	
130302: Measurement & Instrumentation (LAB)	CO1	Handle an instrument and perform basic calibration	3.0	2.3	2.9	1	1	1	1		3	3	3	3	3				2
	CO2	Estimate the deviations in measurements due to possible errors and measures to minimize them based on their characteristics.	3.0	2.2	2.8	1	1	1	1		3	3	3	3	3				2
	CO3	Measure unknown resistance, inductance and capacitance	3.0	1.5	2.7	1	1	1	1		3	3	3	3	3				2
	CO4	Teamwork skills for working effectively in groups and develop analytical skills to compare experimental results with theoretical concepts	3.0	1.8	2.8	1	1	1	1		3	3	3	3	3				2
	CO5	Prepare and present an organized written engineering report on electronic testing of digital circuits.	3.0	2.0	2.8	1	1	1	1		3	3	3	3	3				2
		130302: Measurement & Instrumentation (LAB)																	
130303: Network Analysis	CO1	State different AC and DC networks laws & theorems.	3.0	2.6	2.9	3	3	2	3	3			1	1	1		1	2	2
	CO2	Apply the knowledge of basic circuital law and simplify the network using reduction techniques	2.9	2.6	2.8	3	3	3	3	3	1	2	1	1	1		1	2	2
	CO3	Solve the complicated network using theorems	3.0	2.5	2.9	3	3	3	3	3	1	2	1	1	1		1	2	2

	CO4	Infer and evaluate transient response, steady state response and network functions.	2.6	2.5	2.6	3	3	3	3	3	1		1	1	1		1	2	2
	CO5	Analyze the series resonant and parallel resonant circuit,	3.0	2.8	3.0	3	3	3	3	3			1	1	1		1		
	CO6	Evaluate two-port network parameters.	3.0	1.8	2.8	3	3	2	3	3			1	1	1		1		
		130303: Network Analysis																		
130303: Network Analysis (LAB)	CO1	Analyze the Thevenin's equivalent circuits and linear superposition and apply them to laboratory measurements.	3.0	2.2	2.8	1	1	1			3	3	3	3	3				2
	CO2	Relate physical observations and measurements involving electrical circuits to theoretical principles	3.0	2.1	2.8				1		3	3	3	3	3				2
	CO3	Predict and measure the transient and sinusoidal steady-state responses of simple RL, RC and RLC circuits.	3.0	2.0	2.8		1	1	1		3	3	3	3	3				2
	CO4	Teamwork skills for working effectively in groups and develop analytical skills to compare experimental results with theoretical concepts	3.0	1.9	2.8						3	3	3	3	3				2
	CO5	Prepare and present an organized written engineering report on electronic testing of digital circuits.	3.0	1.9	2.8						3	3	3	3	3				2
		130303: Network Analysis (LAB)																		
130304: Analog Electronics	CO1	Define working principles of electronic devices e.g. Diode, Zener Diode, LED, Rectifiers, Transistor, Power Amplifier, Oscillator and Op-Amp.	2.1	2.0	2.1	2	2	2	2		1			1				2	
	CO2	Categorize the different types of Diode, Power Amplifier, Oscillators and Op-Amp and transistor Biasing.	2.2	2.0	2.16	2	2	2	2		1			1				2	
	CO3	Explain the different types of characteristic of Diode, Transistor, Power Amplifier and Op-amp.	2.6	2.1	2.5	2	2	2	2		1			2				2	
	CO4	Illustrate the various mathematical model of transistor eg. Hybrid model, re model.	2.3	1.9	2.2	2	2	2	2		1			2				2	
	CO5	Develop an ability and skill to design different types of diode rectifier, transistor biasing, oscillators and timer circuit.	2.3	2.0	2.2	2	2	2	2		1			2				2	
	CO6	Apply the various principles of electronics to design different types of Analog Electronics circuits for various applications.	1.8	1.9	1.8	2	2	2	2		1			2				2	
		130304: Analog Electronics																		

130304: Analog Electronics (LAB)	CO1	Develop the understanding of diode biasing conditions.	3.0	2.2	2.8							3	2	2	2	2	2		2
	CO2	Investigate the operation of half-wave and full-wave rectifier, and find their performance curves.	3.0	2.1	2.8							3	2	2	2	2	2		2
	CO3	Compare transistor configurations on the basis of input-output characteristics.	3.0	2.0	2.8							3	2	3	2	3	2		2
	CO4	Implement transistor based circuits (Darlington pair, differential amplifier and two- stage RC coupled amplifier).	3.0	2.1	2.8							2	2	2	2	3	2		2
	CO5	Explain operation of operational amplifier (Op-amp), and design Op-amp based Wein bridge oscillator.	3.0	1.9	2.8							3	2	2	2	2	2		2
		130304: Analog Electronics (LAB)																		
130305: Software Lab-I	CO1	Design engineering problem and validate the results using MATLAB environment.	3.0	2.0	2.8	2			2	3				2	2	2		2	2
	CO2	Validate the concepts of network theorems by writing MATLAB codes	3.0	2.3	2.9	2			2	3				2	2	2		2	2
	CO3	Analyze the waveforms on parameter variation of PV Array module using MATLAB Environment	3.0	2.5	2.9	2			2	3				2	2	2		2	2
	CO4	Compare the performance of basic converters using MATLAB environment	3.0	2.5	2.9	2			2	3				3	3	2		2	2
	CO5	Prepare and present an organized written engineering report on electronic testing of digital circuits.	3.0	2.1	2.8	2			2	3				3	3	2		2	2
		130305: Software Lab-I																		
130306 : Self learning	CO1	Refer various technical recourses available from multiple field	3.0	2.2	2.8	2	2	2						1	2	2	2	2	1
	CO2	Adhere to deadlines and commitment to complete the assignment	3.0	2.1	2.8	2	2	2						1	2	2	2	2	1
	CO3	Improve performance in self learning domain	3.0	2.0	2.8	2	2	2						1	2	2	2	2	1
	CO4	Acquire additional knowledge for competitive examinations	3.0	2.1	2.8	2	2	2						1	2	2	2	2	1
		130306 : Self learning																		
130307 : Summer Internship	CO1	Relate the theoretical aspects learned in classes into practical world	3.0	2.2	2.8	2	2	2						2	2	2		2	
	CO2	Apply the new skills and supplement knowledge other than curriculum	3.0	2.2	2.8	2	2	2						2	2	2		2	
	CO3	Practice communication and teamwork skills	3.0	1.5	2.7	2	2	2						2	2	2		2	
	CO4	Apply the knowledge for placement & higher education	3.0	1.8	2.8	2	2	2						2	2	2		2	

		CO5	Troubleshoot the problems related to particular experiment	3.0	2.0	2.8	2	2	2						2	2	2		2	
semester 4			130307 : Summer Internship																		
	100003:Mathematics- III	CO1	Formulate Complex Variable Functions	3.0	2.2	2.8	3	2	2						2	2	2		2	
		CO2	Solve the Complex Integral Problems	3.0	2.2	2.8	3	2	2						2	2	2		2	
		CO3	Find the Optimal Solution using Various Methods of Linear Programming Problem.	3.0	1.5	2.7	3	2	2						2	2	2		2	
		CO4	Apply different numerical methods in engineering problem	3.0	1.8	2.8	3	2	2						2	2	2		2	
		CO5	Solve Ordinary Differential Equation by Numerical Techniques	3.0	2.0	2.8	3	2	2						2	2	2		2	
		100003:Mathematics- III																			
	130402: Electrical Machines-I	CO1	Comprehend the principles and construction of different AC and DC machines.	2.7	1.9	2.5	3	3	2	3	3		1					2	2	1	
		CO2	Demonstrate an understanding of the fundamental control practices such as starting, reversing, braking, plugging etc associated with AC and DC machines.	2.9	1.8	2.7	3	3	3	3	2		2	3	1	2				1	
		CO3	Distinguish between the application and performance of AC and DC machines.	3.0	1.8	2.8	2	3	3	2	1	1		2	1	1	2	1		2	
		CO4	Develop the equivalent circuits and compute the induced emf, torque, efficiency, losses etc.	3.0	1.9	2.8	3	3	3	3					1				1	1	
		CO5	Describe the different test conducted for testing the performance of different AC and DC machines.	3.0	1.9	2.8	3	3	2	3				1	1	1			1	2	
		CO6	Formulate the various performance parameters of machines under different operating conditions.	2.9	2.1	2.7	3	3	3	2	1	1	1	2	1	1	2	1		1	
			130402: Electrical Machines-I																		
	130402: Electrical Machines-I (LAB)	CO1	Estimate which apparatus at what rating is required for a particular experiment	3.0	2.2	2.8				2			3		2	2	2				
		CO2	Utilise a DC machine for a specific purpose, requirement	3.0	2.2	2.8				2			3	2	2	2	2		3		
		CO3	Predetermine the efficiency of any transformer, regulation of any transformer	3.0	1.5	2.7				2			2	3	2	2	2		3		
		CO4	Prepare and present an organized written engineering report on electronic testing of digital circuits.	3.0	1.8	2.8				2				2	3	3	2		3		
		CO5	Develop the ability to work is team and learns professional ethics.	2.0	2.5	2.1				2				2	3	3	2		3		
			130402: Electrical Machines-I (LAB)																		

130401: Digital Electronics & Microprocessor	CO1	Define Number systems and codes, Logic family, Digital circuits and Microprocessor.	3.0	1.9	2.8	3	3	3										2	
	CO2	Simplify the logic expressions using Boolean laws, map method and design them by using logic gates.	2.6	1.8	2.4	3	3	3										2	
	CO3	Explain the concept of different number system, logic Families and Microprocessor.	3.0	1.8	2.8	2	3	3										2	
	CO4	Illustrate different types of Number system, Combinational circuits, sequential circuits and Microprocessor.	3.0	1.9	2.8	2	3	3										2	
	CO5	Develop an ability to design combinational and sequential circuits using Logic gates for different applications	1.4	1.9	1.5	2	2	2										2	
	CO6	Apply the various principle of digital electronics and programming skill to develop different Digital circuits.	1.4	2.1	1.5	2	2	2										2	
		130401: Digital Electronics & Microprocessor																	
130401: Digital Electronics & Microprocessor (LAB)	CO1	Develop skill to build, and troubleshoot digital circuits	3.0	2.0	2.8						3	2	2					2	
	CO2	Correctly operate standard electronic test equipment such as oscilloscopes, signal analyzers, digital multi-meters, power supplies, frequency meters, and programmable memories programmers to analyze, test, and implement digital circuits.	3.0	2.4	2.9						3	2	2					2	
	CO3	Apply troubleshooting techniques to test digital circuits.	3.0	2.1	2.8						3	2	2					2	
	CO4	Prepare and present an organized written engineering report on electronic testing of digital circuits.	3.0	1.9	2.8						3	2	2					2	
	CO5	Develop the ability to work is team and learns professional ethics.	3.0	2.1	2.8						3	2	2					2	
		130401: Digital Electronics & Microprocessor (LAB)																	
130403 : Control Systems	CO1	Develop mathematical models of mechanical system, electrical system and electromechanical system	3.0	2.3	2.9	3	3	3	3	3		1	1	1	2		2	3	3
	CO2	Represent the complex system into standard canonical form by signal flow graph and block diagrams reduction rules	2.9	2.0	2.7	3	3	3	3	3		1	1	1			2	3	2
	CO3	Compute the time and frequency-domain responses of first and second-order systems to standard inputs	2.3	2.1	2.3	3	3	3	2	2		1	1	1	2		2	3	1
	CO4	Formulate control engineering problems in state-variable form	3.0	2.0	2.8	3	3	3	2	3	1	1	1	1	2		2	3	3

	CO5	Evaluate the stability of a closed-loop control system in time-domain as well as in frequency-domain.	3.0	1.9	2.8	3	3	3	3	3	2	1	1	1	1		2	3	3
	CO6	Predict the nature of response for the given input	1.1	2.0	1.3	3	3	3	3	3		1	1	1					
		130403 : Control Systems																	
130404: Power System-I	CO1	Explain general structure of power systems.	1.2	2.4	1.4	3	3	3	3	2	2	2	2	1	3	1		1	2
	CO2	Develop the knowledge of generation of electricity based on conventional and nonconventional energy sources.	1.6	2.1	1.7	3	3	3	2	2	2	3	3	1	2		2	1	1
	CO3	Determine the transmission line parameters.	2.6	1.9	2.5	3	3	3	3	2	1		3		3		1	1	1
	CO4	Analyze the performance of overhead transmission line.	2.8	2.0	2.6	3	3	3	3	2	1		3		3		1	1	1
	CO5	Apply the concept of power plant economics.	2.1	2.0	2.1	3	3	3	3	2	2	1	2	1	2		2	1	2
	CO6	Compare different types of tariffs and power factor improvement methods	1.0	1.7	1.1	3	3	3	3	2	3		3		3		2	1	3
		130404: Power System-I																	
100004: Cyber Security	CO1	Explain basic terminologies of cyber security.	1.6	2.2	1.7	3	3	3	1	2	3						3		
	CO2	Explain the basic concept of networking and internet.	2.3	2.3	2.3	3	3	3	1	2	2						3		2
	CO3	Apply various method used to protect data in the internet environment in real world situation.	1.9	2.0	1.9	3	2	3	1	2	2				2		3		
	CO4	Discover the concept of IP security and architecture.	2.2	2.0	2.2	3				2	2	2		2			2		
	CO5	Compare various type of cyber security threats and vulnerabilities.	2.6	2.1	2.5	3			2	2							2	2	2
	CO6	Develop the understanding of cyber crime investigation and IT ACT 2000.	2.1	2.1	2.1	2	2	2	1	1	2	2	2	2			2	2	2
		100004: Cyber Security																	
130405: Simulation Lab-II:	CO1	Simulate the performance of DC motor using MATLAB Simulink environment	3.0	2.2	2.8	2			2	3								2	
	CO2	Validate the concepts of Induction motor by writing MATLAB codes.	3.0	2.4	2.9	2			2	3								2	
	CO3	Analyze the waveforms on parameter variation of PV Array module using MATLAB Environment	3.0	2.0	2.8	2			2	3								2	
	CO4	Compare the performance of renewable energy sources using MATLAB environment	3.0	2.0	2.8	2			2	3								2	
	CO5	Design engineering problem and validate the results using MATLAB environment	3.0	2.1	2.8	2			2	3								2	
																			130405: Simulation Lab-II:

semester 5	100005: Ethics, Economics, Entreprenership & Management	CO1	Impart knowledge and awareness regardinginternal and external environment of management	2.2	2.2	2.2	3	2		2		2	2	1		2		2		
		CO2	Develop spoken ability in a student so that he may acquire the ability to organise and express his ideas	1.5	2.3	1.7	3	2		2						2		2		
		CO3	Predict the situation and to be good decision maker through the case studies and role plays based on actual situation	1.6	2.0	1.6	2	2	2	1						2		2		1
		CO4	Develop a sound knowledge about economy and economics and to be able to understand how money and finance is to be handled	2.2	2.0	2.2	3	3	1	1			2			2		2		
		CO5	Work out needs so as to develop a working knowledge about starting and managing an enterprise	1.5	2.1	1.6	3	3	2	1	2					2		2	1	2
		CO6	Find out ways of solving / overcoming hurdles that crop up while establishing / managing his own enterprise	1.5	2.1	1.6	2	2	1	1		2	2			2		2		
																					100005: Ethics, Economics, Entreprenership & Management
	130501: Signals & Systems	CO1	Explain the process of sampling and the effects of under sampling.	3.0	2.2	2.8	3	3	3	3	1								2	2
		CO2	Classify systems based on their properties and determine the response of LSI system using convolution.	2.9	2.1	2.7	3	3	3	3	1								2	2
		CO3	Apply the concepts of linear algebra to signals.	3.0	2.0	2.8	3	3	3	3	1								2	2
		CO4	Analyze the spectral characteristics of continuous-time periodic and a periodic signal using Fourier analysis.	2.9	1.9	2.7	3	3	3	3	1								2	2
		CO5	Analyze system properties based on impulse response and Fourier analysis.	2.9	1.9	2.7	3	3	3	3	1								2	2
		CO6	Apply the Laplace transform and Z- transform for analysis of continuous-time and discrete-time signals and systems	0.9	1.9	1.1	3	3	3	3	1								2	2
																					130501: Signals & Systems
	130502: Power System II	CO1	Explain the concepts of single line diagram and per unit system	3.0	1.8	2.8	3	3	3	2	2	3	3		2	2	3	2	3	3
		CO2	Apply different load flow techniques to solve load flow problem	1.4	1.2	1.4	3	3	3	2	2	2	3		2	2	3	2	3	3
		CO3	Perform fault calculations for symmetrical and unsymmetrical faults	0.9	1.2	1.0	3	3	3	2	2	3	3		2	2	3	2	3	3
		CO4	Explain the theoretical and practical aspects of Power System Stability, and its enhancement	2.3	1.8	2.2	3	3	3	2	2	2	3		2	2	3	2	3	3

	CO5	Elucidate the automatic generation control reactive power, voltage control, series and shunt compensation	3.0	1.2	2.6	3	3	3	2	2	2	3		2	2	3	2	3	3
	CO6	Discuss the insulation resistance, capacitance of various types of cables and the need of HVDC transmission.	2.2	1.2	2.0	3	3	3	2	2	2	3		2	2	3	2	3	3
		130502: Power System II																	
130502: Power System II (Lab)	CO1	Demonstrate the performance EHVAC transmission on simulation panel.	3.0	2.4	3	2	2	3	2	2	2	2				2	3		2
	CO2	Determine transmission line parameters.	2.9	2.1	3	2	2	3	3	2	2	2				2	3		2
	CO3	Simulate the different types of faults in transmission line using MATLAB.	3.0	1.5	3	3	2	3	2	2	2	2			2		3		2
	CO4	Prepare report for presentation.	2.9	1.6	3	2		3		2	2	3		2	2		2		2
	CO5	Display team work.	2.9	2.0	3	2		3	2	2		3		2	2		2		2
		130502: Power System II (Lab)																	
130503: Electrical Machine-II	CO1	Analyze the performance of 3-phase induction and synchronous machines using equivalent circuits & phasor diagrams under different loading conditions.	2.8	2.2	3	3			2			3				2			
	CO2	Explain the constructional details and working principle of three phase transformer and synchronous machine.	2.8	2.4	3	3	2	3				3	2			2		3	
	CO3	Develop phasor diagram and determine voltage regulation of an alternator and its steady state performance.	3.0	2.3	3	3	3	2				2	3			3		3	
	CO4	Determine time constant, various sequence reactance and equivalent circuit parameters under transient conditions for synchronous machines.	2.6	2.1	2	3			3			2				2			
	CO5	Analyze the behavior of synchronous machine connected to infinite bus and parallel operation of alternators.	3.0	2.2	3	3	2	1					2					3	
	CO6	Analyze the performance of 3-phase induction and synchronous machines using equivalent circuits & phasor diagrams under different loading conditions.	2.6	2.2	2	3	2	2					2					3	
		130503: Electrical Machine-II																	
130503:Electrical Machine	CO1	Demonstrate an understanding of the fundamental control practices associated with AC machines (starting, reversing, braking, plugging, etc.).	3.0	1.8	3				2		3		2	2					

	CO2	Use accepted national and international standards (such as NEMA, IE Code) to select appropriate electrical machines to meet specified performance requirements.	1.4	1.2	1				2						3	3			
	CO3	Conduct testing and experimental procedures on different types of electrical machines.	1.9	1.2	2				2				2	2				2	2
	CO4	Develop the ability to work is team and learns professional ethics	2.3	1.8	2				2		2					3			1
	CO5	Prepare an organized written report	3.0	1.2	3				2		2			2		3			
		130503:Electrical Machine-II (Lab)																	
130504 : Power Electronics	CO1	Explain static & dynamic characteristics of power electronics devices like Diode SCR, BJT, MOSFET and IGBT. etc	2.2	2.2	2.2	3	3	3		2	2				2				
	CO2	Explain the configuration of different commutation methods.	2.4	2.2	2.4	2	2	3		2	2				2				
	CO3	Describe the configuration of AC to DC converter, Dual converter, chopper, cyclo-converter.	2.3	2.1	2.3	2	3	3		2	2				2				
	CO4	Classify converters and identify their applications.	2.1	2.2	2.1	2	3	3		2	2				2				
	CO5	Develop different model of different converters to calculate their performance parameter	2.3	2.0	2.2	2	3	3		2	2				2				
	CO6	Identify the problems/ limitations of power electronics devices, converters and suggest solution	2.3	2.1	2.2	3	2	3		2	2				2				
		130504 : Power Electronics																	
130504: Power Electronics (Lab)	CO1	Demonstrate VI characteristics of Semiconductor Devices and Various Firing scheme of SCR.	2.4	2.2	2.4	3	3	3		2	2				2				
	CO2	Demonstrate the performance of various converters AC to DC and DC to AC converter	3.0	2.2	2.8	2	2	3		2	2				2				
	CO3	Compare the performance of single and three phases VSI Inverter.	2.3	2.1	2.3	2	3	3		2	2				2				
	CO4	Demonstrate the performance of converters in its different modes of operation.	3.0	2.2	2.8	2	3	3		2	2				2				
	CO5	Prepare an organized written report.	2.3	2.0	2.2	2	3	3		2	2				2				
	CO6	Develop the ability to work is team and learns professional ethics.	2.3	2.1	2.2	3	2	3		2	2				2				
		130504: Power Electronics (Lab)																	
130505: Minor Project I	CO1	Formulate the real-world problems.	3.0	2.2	2.8	2	2	2					3	3	3	3		3	3
	CO2	Express the technical ideas, strategies and methodologies.	2.1	2.4	2.2	2	2	2					3	3	3	3		3	3

		CO3	Utilize the new tools, algorithms, techniques to obtain solution of the project.	2.6	2.3	2.5	2	2	2					3	3	3	3		3	3
		CO4	Prepare oral demonstrations.	1.0	2.1	1.2								3	3	3	3		3	3
																				130505: Minor Project-I
	130506: Summer Internship Project-II	CO1	Know the characteristics of industrial environment.	3.0	2.2	2.8	2	2	2					3	3	3	3		3	3
		CO2	Apply the technical knowledge in real industrial situations.	3.0	2.2	2.8	2	2	2					3	3	3	3		3	3
		CO3	Write the report in technical work/project.	2.3	2.1	2.3	2	2	2					3	3	3	3		3	3
		CO4	Show engineer's responsibilities & ethics.	3.0	2.2	2.8								3	3	3	3		3	3
																				130506: Summer Internship Project-II
	130507:Seminar/Self Study	CO1	Refer various technical recourses available from multiple field.	2.9	2.1	2.7	2	2	2					3	3	3	3		3	3
		CO2	Adhere to deadlines and commitment to complete the assignment.	2.5	2.2	2.4	2	2	2					3	3	3	3		3	3
		CO3	Improve his/her performance in self-learning domain.	1.6	2.2	1.7	2	2	2					3	3	3	3		3	3
		CO4	Acquire additional knowledge helpful for competitive examinations.	1.5	2.1	1.6								3	3	3	3		3	3
																				130507:Seminar/Self Study
Semester 6	130601:Switchgear & Protection	CO1	Explain the concepts, theories and features associated with protective devices and circuit breakers.	2.3	2.1	2.3	3		2								2			
		CO2	Classify relays and circuit breakers based on criterion such as construction, type of supply, working principle, actuating quantities.	2.3	2.2	2.3	2	2				2							2	
		CO3	Select relays and circuit breakers for specific equipments and applications.	2.3	2.2	2.3		2	3											
		CO4	Design protection schemes for generators, motors, transformers and transmission lines.	2.3	2.1	2.3	2	2			3									
		CO5	Analyze the behavior and performance of relays under different loading levels and faults.	2.1	2.0	2.1		3	2										2	
		CO6	Select the protective devices and their locations for protecting power systems against over voltages.	2.2	2.0	2.2											2			
			130601:Switchgear & Protection																	
	130601: Switchgear &	CO1	Operate the Over/Under voltage & over current relays and observe the performance for different settings	3.0	2.2	2.8								2	2	3	2			1

	CO2	Analyze the effect of time and current settings on the operating characteristics of an Inverse Definite Minimum Time (IDMT) relay	2.3	2.1	2.3								2	2	3	2			1
	CO3	Validate the characteristics of percentage biased differential relay for different bias settings	3.0	2.2	2.8								2	2	3	2			1
	CO4	Prepare an organized written report.	2.3	2.0	2.2								2	2	3	2	3		1
	CO5	Develop the ability to work is team and learns professional ethics.	2.3	2.1	2.2								2	2	3	2			1
		130601:Switchgear & Protection Lab																	
130602: Electrical Engineering Materials	CO1	Describe properties and applications of conducting materials	2.3	2.1	2.3	3	3	3	2	2	3	3		2	2	3	2	3	2
	CO2	Explain behavior of semiconductor materials, their classification and applications.	2.9	2.1	2.7	3	3	3	2	2	2	3		2	2	3	2		2
	CO3	Explain application of magnetic materials, different terms, classification, hysteresis and eddy current losses.	2.5	2.2	2.4	3	3	3	2	2	3	3		2	2	3	2		2
	CO4	Explain dielectric materials, their behavior in different fields, polarization and dielectric losses	2.1	2.2	2.1	3	3	3	2	2	2	3		2	2	3	2		2
	CO5	Select appropriate material depending upon specific requirement	2.2	2.1	2.2	3	3	3	2	2	2	3		2	2	3	2		2
		130602: Electrical Engineering Materials																	
130611 : Computer Aided Power System Analysis (DE-1)	CO1	Explain unit commitment and different methods for Solving UC problem	2.4	1.9	2.4	3	3	3		2	2				2				
	CO2	Apply direct method and lamda iteration method for solving economic dispatch problem	2.1	2.2	2.8	2	2	3		2	2				2				
	CO3	Discuss the concept of reactive power, control of active power and reactive power and SVC	2.3	2.4	2.3	2	3	3		2	2				2				
	CO4	Solve the AGC problem in isolated and interconnected power systems	3.0	2.2	2.8	2	3	3		2	2				2				
	CO5	Illustrate Operations Control Centre functions, System monitoring and Contingency Analysis.	2.3	2.4	2.2	2	3	3		2	2				2				
	CO6	Describe various types of ANN and their applications to power system.	2.3	2.6	2.2	3	2	3		2	2				2				
		130611 : Computer Aided Power System Analysis (DE-1)																	
130612:Industrial Automation (DE1)	CO1	Analyze architecture of industrial automation system	2.3	2.1	2.3					2	3	3		2	2	3	2		2
	CO2	Select appropriate sensors	3.0	2.2	2.8					3	2	3		2	2	3	2		2
	CO3	Acquire PLC knowledge	2.1	2.4	2.2					3	3	3		2	2	3	2		2
	CO4	Acquire the knowledge of PID control technique	2.6	2.3	2.5					2	2	3		2	2	3	2	3	2
	CO5	Develop small application using PLC & transducer,	2.3	2.1	2.3					2	2	2							2

	CO6	Compare AC and DC drives for particular applications	2.3	2.1	2.3					2	2	3		2	2	3	2		2
																					130612:Industrial Automation (DE1)
130651: Non Conventional Energy Resources	CO1	Identify energy demand and relate with available energy resources	2.2	2.3	2.2	3									3				
	CO2	Discuss the techniques for harnessing of solar energy.	2.2	2.3	2.2	3	2				2				2				
	CO3	Describe the method for harnessing of wind energy	2.2	2.3	2.2		3			3	3			3	2		3		
	CO4	Analyze harnessing of Biomass energy, Geothermal and Ocean energies and Magneto hydrodynamics and Fuel cell technology	2.2	2.3	2.2	3			3	2					2		2		
																					130651: Non Conventional Energy Resources DE2(SWAYAM/ NPTEL)
100007:Disaster Management	CO1	Propose disaster prevention and mitigation approaches.	3.0	2.2	2.8			2	3	3		2	2	3	2				
	CO2	Classify global and national disasters, their trends and profiles.	2.1	2.4	2.2			3	2	3		2	2	3	2				
	CO3	Appreciate the impacts of various disasters.	2.6	2.3	2.5			3	3	3		2	2	3	2				
	CO4	Apply Disaster Risk Reduction in management.	2.2	2.4	2.2			2	2	3		2	2	3	2				
	CO5	Find the linkage between disasters, environment and development	2.3	2.1	2.3	2	2	2							2				
																					100007:Disaster Management
900103: (OC1) Energy Conservation & Management	CO1	Explain the basic concepts of Energy Audit & its various terminologies, rules and regulations, policy and how to write reports.	2.3	2.1	2.3	3								3	3			3	3
	CO2	Acquire fundamental knowledge on the science of energy and on both the conventional and non-conventional energy technologies	2.9	2.1	2.7	3	2				2			3	3			3	3
	CO3	Describe different energy auditing methods and the implementation procedures	2.5	2.2	2.4		3			3	3			3	3			3	3
	CO4	Identify present scenario of energy utilization, management and corresponding ACT of regulatory commission	2.1	2.2	2.1	3			3	2									
	CO5	Recognize process billing, energy tariff and power factor improvements to achieve energy efficient systems.	2.2	2.1	2.2	3								3	3			3	3
																					900103: (OC1) Energy Conservation & Management
semeste	130711: Electric	CO1	Describe various components of a drive system along with modes of operation, control needs and identify stable/unstable regions	2.2	2.2	2.2	3									3				

	CO2	Explain various drives & loads, their characteristics and control methods under various operating	2.4	2.2	2.4	3	2				2				2				
	CO3	Explain performance analysis & control of dc drives	2.3	2.1	2.3		3			3	3			3	2		3		
	CO4	Explain performance analysis & control of ac drives	2.2	2.2	2.2	3			3	2					2		2		
	CO5	Employ the various static converters for speed control of different types of drives	2.3	2.0	2.2	3						2			2				
	CO6	Illustrate the functioning of solar, battery powered and traction drives and explain energy conservation methods	2.3	2.1	2.2	2	3	2		2		3		2	3	3	2		
		130711: Electrical Drives (DE3)																	
130751: Introduction to Smart Grid DE4) (NPTEL)	CO1	Apply advanced knowledge of electrical power system operations and control to analyse the hallenges and opportunities due to increased penetration of renewable energy sources	2.1	2.0	2.1	3									3			3	3
	CO2	Conceptualize the design of smart grid by selecting appropriate communication	2.1	2.0	2.1	3	2				2				2			3	3
	CO3	Describe the principles and requirements of the next generation future power network	2.1	2.0	2.1		3			3	3			3	2		3	3	3
	CO4	Describe the latest trends in IoT for power systems	2.1	2.0	2.1	3			3	2					2		2	3	3
		130751: Introduction to Smart Grid DE4) (NPTEL)																	
900201:Applications of Electrical Motor & Equipment	CO1	Discuss the various types of electrical equipments and their suitable applications.	2.2	2.0	2.2	2	2			1								1	2
	CO2	Describe the various schemes of AC, DC drives, traction schemes and different braking systems.	2.1	1.8	2.0	2	2		2									1	2
	CO3	Explain the basics of lighting and illumination and its parameters and able to design Illumination systems for various applications	2.2	2.1	2.2	2	2	2		2								1	2
	CO4	Apply the concepts of power electronics technology in efficient utilization of electrical power.	1.9	2.2	2.0	2	2	2	1		2						2	1	2
	CO5	Identify the area for research in field of electric traction & utilization of Electric energy	1.8	1.8	1.8	2	2		1		2							1	2
		900201:Applications of Electrical Motor & Equipment																	
130701:Control System	CO1	Discuss the need of MATLAB to illustrate modeling and simulation of any system	3.0	2.2	2.8	2	3			2	3	3		2	2	3	2		2
	CO2	Classify and evaluate the performance parameters of a system and then with simulation	3.0	2.0	2.8		3		2	3	2	3		2	2	3	2		2

		prepare an advance tool to modify the values of the parameter of the system in order to meet the desired need.																		
	CO3	Prepare professionals in laboratory to compute or to predict the characteristics of a system by visualizing experimental data and its graphical representation	3.0	1.9	2.8		3	2		3	3	3		2	2	3	2		2
	CO4	Evaluate possible causes of discrepancy in practical experimental observations in comparison to theoratical concepts theory by introducing the concepts of different stability theorems	3.0	1.8	2.8	2		2	1	2	2	3		2	2	3	2	3	2
	CO5	Demonstrate the ability to interact via team work effectively on a social and interpersonal level with fellow students, and will develop the ability to divide up and share task responsibilities to complete assignments	3.0	1.9	2.8	2	3		1	2	2	3		2	2	3	2		2
																				130701:Control System Lab
130702: Summer Internship Project	CO 1.	Formulate the real world problems.	3.0	2.4	2.9	2	2	2	2				3	3	3	3	2	3	3	
	CO 2.	Express the technical ideas, strategies & methodologies.	3.0	2.4	2.9	2	2	2	2				3	3	3	3	2	3	3	
	CO 3.	Utilize the new tools, algorithms, techniques to obtain solution of the project.	3.0	1.9	2.8	2	2	2	2				3	3	3	3	2	3	3	
	CO 4.	Test & validate the developed prototype/results.	3.0	2.3	2.9	2	2	2	2				3	3	3	3	2	3	3	
	CO 5.	Write a project report.	3.0	2.4	2.9	2	2	2	2				3	3	3	3	2	3	3	
	CO 6.	Prepare oral demonstrations.	3.0	2.5	2.9	2	2	2	2				3	3	3	3	2	3	3	
																				130702: Summer Internship Project
130703: Creative Problem	CO1	Identify real time problems	3.0	2.3	2.9	3	3	3	3	2				2	2	2	2	2	2	
	CO2	Practice various methods to solve problems	3.0	2.4	2.9	3	3	3	3	2				2	2	2	2	2	2	
	CO3	Produce solutions to various problems	3.0	2.6	2.9	3	3	3	3	2				2	2	2	2	2	2	
	CO4	Demonstrate various problems solving skills	3.0	2.2	2.8	3	3	3	3	2				2	2	2	2	2	2	
																				130703: Creative Problem Solving
100008:Intellectual Property	CO1	Imbibe the knowledge of Intellectual Property and its protection through various laws	2.9	2.2	2.8				2	2				3	2		2			
	CO2	Apply the knowledge of IPR for professional development	2.5	2.2	2.4	2	2		3	1	3	3					2	2	2	

		CO3	Develop a platform for protection and compliance of Intellectual Property Rights & knowledge	2.1	2.2	2.1	3	3	2	2	2	2		2	1	2		3	3	2
		CO4	Create awareness amidst academia and industry of IPR and Copyright compliance	2.2	2.1	2.2	2	2		3	2				2	3		2		1
		CO5	Deliver the purpose and function of IPR and patenting.	2.6	2.3	2.5	2	2	2	2	2	2	2	2	2	2	1	3	2	2
																					100008:Intellectual Property Rights(IPR)
semester 8	130801 : Internship/ Project	CO 1	Formulate the real world problems.	3.0	2.4	2.9	2	2	2	2				3	3	3	3		3	3
		CO 2	Express the technical ideas, strategies & methodologies.	3.0	2.4	2.9	2	2	2	3				3	3	3	3		3	3
		CO 3	Utilize the new tools, algorithms, techniques to obtain solution of the project.	3.0	2.4	2.9	2	2	2	2				3	3	3	3		3	3
		CO 4	Test & validate the developed prototype/results.	3.0	2.3	2.9	2	2	2	3				3	3	3	3		3	3
		CO 5	Write a project report.	3.0	2.4	2.9	2	2	2	2				3	3	3	3		3	3
		CO 6	Prepare oral demonstrations.	3.0	2.5	2.9	3	2	2	2				3	3	3	3		3	3
																					130801 : Internship/ Project
	130802 : Professional Development	CO 1	Develop intellectual curiosity, competency and skills	3.0	2.4	2.9						3	3	3	3	3	3	3	3	3	3
		CO 2	Develop critical thinking, creativity and effective communication	3.0	2.4	2.9						3	3	3	3	3	3	3	3	3	3
		CO 3	Display professionalism and ownership of professional growth and learning	3.0	2.4	2.9						3	3	3	3	3	3	3	3	3	3
																					130802 : Professional Development