

Madhav Institute of Technology & Science Gwalior-5

Department of Electrical Engineering																					
2016-2020				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	BEEL301: Electrical Engineering Materials	CO1	Elaborate the concept of conducting materials, their properties and applications	2.1	2.0	2.09	2	2	3	2	2		2						2	2	
		CO2	Explain concept of semiconductor materials, their classification and applications	2.2	2.0	2.16	2	2	2	2	2			3						2	2
		CO3	Apply various types of materials in the field of Electrical Engineering	2.6	2.1	2.51	2	2	3	3	2									2	2
		CO4	Explain dielectric materials, their behavior in different fields, polarization and dielectric loss	2.3	1.9	2.23	2	2	3	3	2										2
		CO5	Recognize the insulating materials, various properties of solid, liquid and gaseous insulating materials, testing of transformer oil	2.3	2.0	2.24	2	2	2	2	2										2
		CO6	Apply various types of materials in the field of Electrical Engineering	1.8	1.9	1.81	2	2	2	2	2										2
			BEEL301: Electrical Engineering Materials																		
	BEEL302:	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			
		BEEL302: Measurement & Instrumentation																	
BEEL302: Measurement & Instrumentation	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	
		BEEL302: Measurement & Instrumentation (LAB)																	
BEEL303: 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 circuit 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

	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	
		BEEL305: Electro Magnetic Field Theory																		
BEEP306: Simulation Lab-I	CO1	Design engineering problem and validate the results using MATLAB environment.	3.0	2.0	2.8	2	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
		BEEP306: Simulation Lab-I																		
BEEL307 : Idea	CO1	Refer various technical recourses available from multiple field	3.0	2.2	2.8	2	2	2							3	2	2	2	2	1
	CO2	Adhere to deadlines and commitment to complete the assignment	3.0	2.1	2.8	2	2	2							3	2	2	2	2	1

		Numerical Methods to examine the real world problem																		
	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		
BEEL401: Mathematics-III																				
BEEL402: 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	2	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
BEEL402: Electrical Machines-I																				
BEEL402: Electrical	CO1	Estimate which apparatus at what rating is required for a particular experiment	3.0	2.2	2.8							3		2	2	2				
	CO2	Utilise a DC machine for a specific purpose, requirement	3.0	2.2	2.8							3	2	2	2	2			3	
	CO3	Predetermine the efficiency of any transformer, regulation of any transformer	3.0	1.5	2.7							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	3	3	2		3
	CO5	Develop the ability to work in team and learn professional ethics.	2.0	2.5	2.1									2	3	3	2		3
	BEEL402: Electrical Machines-I (LAB)																		
BEEL403: 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
	BEEL403: Digital Electronics & Microprocessor																		
BEEL403: Digital	CO1	Develop skill to build, and troubleshoot digital circuits	3.0	2.0	2.8							3	2	2					1
	CO2	Correctly operate standard electronic test equipment such as oscilloscopes, signal analyzers, digital multi-meters, power supplies, frequency meters, and programmable memories	3.0	2.4	2.9							3	2	2					1

		programmers to analyze, test, and implement digital circuits.																	
	CO3	Apply troubleshooting techniques to test digital circuits.	3.0	2.1	2.8						3	2	2					1	
	CO4	Prepare and present an organized written engineering report on electronic testing of digital circuits.	3.0	1.9	2.8						3	2	2					1	
	CO5	Develop the ability to work in team and learn professional ethics.	3.0	2.1	2.8						3	2	2					1	
		BEEL403: Digital Electronics & Microprocessor (LAB)																	
BEEL404 : Linear 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					
		BEEL404 : Linear Control Systems																	
BEEL404 :	CO1	Discuss the need of MATLAB to illustrate modeling and simulation of any system	3.0	2.2	2.8					2	3	3		2	2	3	2		2
	CO2	Classify and evaluate the performance parameters of a	3.0	2.0	2.8					3	2	3		2	2	3	2		2

		system and then with simulation 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	3	3		2	2	3	2	2	
	CO4	Evaluate possible causes of discrepancy in practical experimental observations in comparison to theoretical concepts theory by introducing the concepts of different stability theorems	3.0	1.8	2.8					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	2	3		2	2	3	2	2	
			BEEL404 : Linear Control Systems (Lab)																
BEEL405: Signals & Systems	CO1	Explain the process of sampling and the effects of under sampling	1.2	2.4	1.4	3	3	3	3	2	2	2	2	1	3	1		1	2
	CO2	Classify systems based on their properties and determine the response of LSI system using convolution	1.6	2.1	1.7	3	3	3	2	2	2	3	3	1	2		2	1	1
	CO3	Apply the knowledge of linear algebra topics like vector space, basis, dimension, inner product, norm and orthogonal basis to signals	2.6	1.5	2.4	3	3	3	3	2	1		3		3		1	1	1

		module using MATLAB Environment																				
	CO4	Compare the performance of renewable energy sources using MATLAB environment	3.0	2.1	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					
		BEEP406: Simulation Lab-II																				
	BEES408: Integrated Ethics &	CO1	Exposed to various NGO's/Hospitals/Industries and Social welfare agencies	3.0	2.3	2.9					3		2	2	2	3		2	2	2		
		CO2	Gain practical knowledge in the field of social work based on the specialization	2.9	2.0	2.7					3	2	2	2	2	3	2	2	2	2	2	
		CO3	Adopt professional values and ethics of the profession	2.3	2.1	2.3					2	3	2	2	2	2	3	2	2	2	2	
		CO4	Apply the knowledge of social work practice	3.0	2.0	2.8						2	3	3	2		2	3	3	2		
		CO5	Work independently applying the knowledge of social work	3.0	1.9	2.8						2	3	3	2		2	3	3	2		
		BEES408: Integrated Ethics & Aptitude																				
semester 5	BEEL503: Non-conventional Energy	CO1	Recognise the energy demand of world, nation and available resources to fulfill the demand	2.2	2.2	2.2	3	2		2		2	2	1		2		2				
		CO2	Review about the conventional energy resources and their effective utilization	1.5	2.3	1.7	3	2		2							2		2			
		CO3	Acquire the knowledge of modern energy conversion technologies	1.6	2.0	1.6	2	2	2	1							2		2		1	
		CO4	Perform the various characterization techniques of fuels	2.2	2.1	2.2	3	3	1	1			2				2		2			
		CO5	Identify available nonconventional (renewable) energy resources and	1.5	2.1	1.6	3	3	2	1	2						2		2	1	2	

		techniques to utilize them effectively.																
	CO6	Find out domestic, rural and local solutions for energy crisis	1.5	2	1.6	2	2	1	1		2	2			2		2	
BEEL503: Non-conventional Energy Resources																		
BEEL504: Control System Design	CO1	Specify control system performance in the frequency-domain in terms of gain and phase margins, and design compensators to achieve the desired performance.	3.0	2.2	2.8	3	3	3	3	1							2	2
	CO2	Design Lead-Lag compensators based on frequency data for an open-loop linear system.	2.9	2.1	2.7	3	3	3	3	1							2	2
	CO3	Express and solve system equations in state-variable form	3.0	2.0	2.8	3	3	3	3	1							2	2
	CO4	Propose state feedback controllers by using pole-placement technique	2.9	1.9	2.7	3	3	3	3	1							2	2
	CO5	Demonstrate the effect on non linearity in control system by using phase plane technique and describing function method	2.9	1.9	2.7	3	3	3	3	1							2	2
	CO6	Discuss the basic structure of a sampled-data system, applications of z-transform transform, compute discrete-time equivalents of continuous-time plants using zero-order hold and performance and stability in control design	0.9	1.9	1.1	3	3	3	3	1							2	2
BEEL504: Control System Design																		
BEEL504: Control	CO1	Design different control law or algorithms like proportional control, proportional plus derivative(PD) control, proportional plus integration(PI) control, and proportional plus	3.0	2.2	2.8					2	3	3		2	2	3	2	2

		integration plus derivative (PID) control and different compensators like lag, lead, lag-lead																
	CO2	Develop state space models of electrical, mechanical, thermal and fluid system and different control system components like servomotors etc	3.0	2.0	2.8					3	2	3		2	2	3	2	2
	CO3	Analyse stability of nonlinear systems	3.0	2.2	2.8					3	3	3		2	2	3	2	2
	CO4	Evaluate possible causes of discrepancy in practical experimental observations in comparison to theoretical concepts	3.0	2.3	2.9					2	2	3		2	2	3	2	3
	CO5	Demonstrate the ability to interact via team work	3.0	2.1	2.8					2	2	3		2	2	3	2	2
BEEL504: Control System Design Lab																		
BEEL505: Transmission and Distribution	CO1	List difference between transmission and distribution and classify transmission and distribution systems with their advantages and disadvantages.	3.0	1.8	2.8	3	3	3	2	2	3	3		2	2	3	2	3
	CO2	Compute voltage drop, power loss, economic limit of transmission voltage and conductor size.	1.4	1.2	1.4	3	3	3	2	2	2	3		2	2	3	2	3
	CO3	Recognise and analyze transmission line parameters.	0.9	1.2	1.0	3	3	3	2	2	3	3		2	2	3	2	3
	CO4	Clarify & implement need and use of per unit system.	2.3	1.8	2.2	3	3	3	2	2	2	3		2	2	3	2	3
	CO5	classify and performance calculations of different models of transmission line,	3.0	1.2	2.6	3	3	3	2	2	2	3		2	2	3	2	3

	CO6	Enumerate need and types of insulators, line supports, cables & corona and related calculations.	2.2	1.2	2.0	3	3	3	2	2	2	3		2	2	3	2	3	3
BEEL505: Transmission and Distribution																			
BEEL505: Transmission and Distribution	CO1	Define different part of EHV transmission line simulation panel	3.0	2.4	3	2	2	3	2	2	2	2				2	3		2
	CO2	Enumerate resistance, inductance, and capacitance of transmission line	2.9	2.1	3	2	2	3	3	2	2	2				2	3		2
	CO3	Analyze different type of insulators, line supports.	3.0	1.5	3	3	2	3	2	2	2	2			2		3		2
	CO4	Classify different types and applications of cables.	2.9	1.6	3	2		3		2	2	3		2	2		2		2
	CO5	Prepare and present an organized written engineering report on electronic testing of digital circuits.	2.9	2.0	3	2		3	2	2		3		2	2		2		2
	CO6	Develop the ability to work in team and learn professional ethics.	2.9	1.7	3	2	2	3	2	2	2	2		2	2		2		2
BEEL505: Transmission and Distribution (LAB)																			
BEEL506: Electrical Machines-II	CO1	Formulate and then analyze the working of any electrical machine using mathematical model under loaded and unloaded conditions.	2.8	2.2	3	2	1	3	2	3			1	1	1	2		2	
	CO2	Explain the working principle and different types of connections of three phase transformer	2.8	2.4	3	3	3	3	2	2			2	1	1	2	1		
	CO3	Derive the relation between real and reactive power control with application to the equivalent circuit of a synchronous machine.	3.0	2.3	3	3	2	2	2	1	1		1	1	1			3	2
	CO4	Demonstrate an understanding of the fundamental control practices associated with AC machines (starting, reversing, braking, plugging, etc.)	2.6	2.1	2	2	3	3	3					1				3	1

	CO5	Use accepted national and international standards (such as NEMA) to select appropriate electrical machines to meet specified performance requirements	3.0	2.2	3	3	3	3	2					1	1	1		1	2	
	CO6	Conduct testing and experimental procedures on different types of electrical machines.	2.6	2.2	2	2	2	3	3	1	1	1	2	1	1	2	1		1	
BEEL506: Electrical Machines-II																				
BEEL506: Electrical Machines-I(Lab)	CO1	compare the different methods of starting and speed control of ac motors	3.0	2.2	2.8								3		2	2	2			
	CO2	measure the regulation of alternator by different method	3.0	2.2	2.8								3	2	2	2	2		3	
	CO3	compare the performance characteristics of different electrical machin	3.0	1.5	2.7								2	3	2	2	2		3	
	CO4	distinguish the operational features of synchronous machines and induction machines	3.0	1.8	2.8									2	3	3	2		3	
	CO5	Prepare and present an organized written engineering report on electronic testing of digital circuits.	2.9	2.0	3	2		3	2	2			3		2	2			2	2
	CO6	Develop the ability to work is team and learns professional ethics.	2.9	1.7	3	2	2	3	2	2	2	2	2		2	2			2	2
BEEL506: Electrical Machines-I(Lab)																				
BEEL-501:PMME	CO1	Impart knowledge and awareness regarding internal and external environment of management	3.0	1.8	3							3		2	2					
	CO2	Develop spoken ability in a student so that he may acquire the ability to organise and express his ideas	1.4	1.2	1												3	3		

	CO3	Predict the situation and to be good decision maker through the case studies and role plays based on actual situation	1.9	1.2	2								2	2			2	2	
	CO4	Develop a sound knowledge about economy and economics and to be able to understand how money and finance is to be handled	2.3	1.8	2						2					3		1	
	CO5	Work out needs so as to develop a working knowledge about starting and managing an enterprise	3.0	1.2	3						2			2		3			
	CO6	Find out ways of solving / overcoming hurdles that crop up while establishing / managing his own enterprise	2.2	1.2	2						2			2					
			BEEL-501:PMME																
BEES508/9 Self	CO1	Refer various technical recourses available from multiple field	3.0	2.2	2.8	2	2	2						2	2	2	2	2	1
	CO2	Adhere to deadlines and commitment to complete the assignment	3.0	2.1	2.8	2	2	2						2	2	2	2	2	1
	CO3	Improve performance in self learning domain	3.0	2.0	2.8	2	2	2						2	2	2	2	2	1
	CO4	Acquire additional knowledge for competitive examinations	3.0	2.1	2.8	2	2	2						2	2	2	2	2	1
			BEES508/9 Self Study,Seminar & Group Discussion																
BEEP507: Simulation	CO1	Simulate the performance of DC motor using MATLAB Simulink environment	3.0	2.2	2.8	2			2	3				2	2	2		2	2
	CO2	Validate the concepts of Induction motor by writing MATLAB codes.	3.0	1.9	2.8	2			2	3				2	2	2		2	2
	CO3	Analyze the waveforms on parameter variation of PV Array	3.0	1.8	2.8	2			2	3				2	2	2		2	2

		module using MATLAB Environment																				
	CO4	Compare the performance of renewable energy sources using MATLAB environment	3.0	2.0	2.8	2			2	3				3	3	2		2	2			
	CO5	Design engineering problem and validate the results using MATLAB environment	3.0	1.7	2.7	2			2	3				3	3	2		2	2			
			BEEP507: Simulation Lab-III																			
semester 6	BEEL602: Electric Machine -II	CO1	Explain the concept and purpose of various electrical machine designs.	3.0	2.2	2.8	2			2												
		CO2	Apply theoretical concepts in designing of magnetic circuits, transformers, dc machines, induction motors and synchronous motors	2.1	2.4	2.2		3	2		2								2			
		CO3	Analyze and interpret the design data.	2.6	2.3	2.5	2		3		2										2	
		CO4	Identify, formulate and solve engineering machines problems.	1.0	2.1	1.2		2				2								2		
		CO5	List the steps of computer aided electrical machine design	2.4	2.2	2.4		2	3	2												2
		CO6	Develop computer aided program pertaining to design of magnetic circuits, transformers, dc machines, induction motors and synchronous motors	2.4	2.2	2.4		2		2										2		2
				BEEL602: Electric Machine -II																		
semester 6	BEEL603: Power	CO1	Name power electronics devices (i.e. Diode SCR, BJT, MOSFET and IGBT. etc) and explain their static/ dynamic characteristics.	3.0	2.2	2.8	3	3	3	3	3	1		1	1	2		2	1	1		
		CO2	Illustrate the configuration of different commutation methods.	3.0	2.2	2.8	3	3	3	3	3				1	2		2	2	1	1	

	CO3	Illustrate the configuration of AC to DC converter, Dual converter, chopper, cyclo-converter.	2.3	2.1	2.3	3	3	3	3	3	2	1	1	1	2	2	2	3	2
	CO4	Classify converters and identify their applications.	3.0	2.2	2.8	3	3	3	3	3	2		1	2	2		2	3	3
	CO5	Develop different model of different converters to calculate their performance parameter	2.3	2.0	2.2	3	3	3	3	3	2		1	1	1	2	2	3	3
	CO6	Identify the problems/limitations of power electronics devices, converters and suggest solution.	2.3	2.1	2.2	3	3	3	3	3	2	1	1	1	2		1	1	2
BEEL603: Power Electronics																			
BEEL603: 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 in team and learn professional ethics.	2.3	2.1	2.2	3	2	3		2	2				2				
BEEL603: Power Electronics (Lab)																			
BEEL604: Advanced	CO1	Solve basic binary math operations using the microprocessor / microcontroller.	2.9	2.1	2.7	2	2	2								2		2	
	CO2	Demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor / microcontroller.	2.5	2.2	2.4	2	2	3								2		2	

	CO3	Write program using the capabilities of the stack, the program counter, and the status register	1.6	2.2	1.7	2	3	2								2	1			
	CO4	Apply knowledge of the microprocessor's internal registers and operations by use of a PC based microprocessor simulator.	1.5	2.1	1.6	2	3	3								2	2			
	CO5	Apply the principles of Assembly Language Programming in developing microprocessor/ microcontroller based applications.	2.0	2.0	2.0	2	2	2								2	2			
	CO6	Work with standard microprocessor/ microcontroller interfaces like serial ports, digital-to-analog Converters and analog-to-digital converters etc.	2.9	2.0	2.7	2	2	2								2	1			
		BEEL604: Advanced Microprocessor and Interfacing																		
BEEL605: Applied Instrumentation	CO1	Apply the knowledge of the instruments to use them more effectively	2.3	2.1	2.3	3		2												
	CO2	Suggest the kind of instrumentation scheme for measuring high voltage & current	2.3	2.2	2.3		2				2							2		
	CO3	Balanced the bridge to find unknown values.	3.0	2.2	2.8		2	3												
	CO4	Use Oscilloscope for measuring Frequency & Phase	2.3	2.1	2.3		2				3									
	CO5	Measure strain, displacement, temperature, pressure, vacuum etc	0.9	2.0	1.1		3	2											2	
	CO6	Select method for measurement of high voltages & localization of cable faults	1.6	2.0	1.6															
		BEEL605: Applied Instrumentation																		
BEEL	CO1	Handle an instrument and perform basic calibration	3.0	2.1	2.8										2	2	3	2		1

	CO2	Determine the characteristics of transducer	3.0	2.2	2.8								2	2	3	2		1	
	CO3	Measure unknown resistance, inductance and capacitance	3.0	2.0	2.8								2	2	3	2		1	
	CO4	Find fault in a cable	3.0	2.0	2.8								2	2	3	2	3	1	
	CO5	Teamwork skills for working effectively in groups and develop analytical skills to compare experimental results with theoretical concepts	3.0		2.8								2	2	3	2		1	
	CO6	Prepare and present an organized written engineering report on electronic testing of digital circuits.	3.0		2.8								2	2	2	2		1	
		BEEL605 (LAB): Applied Instrumentation																	
BEEL606: Power System Analysis and Control	CO1	Examine long transmission line representation in terms of generalized circuit parameters.	3.0	2.2	2.8	3	3	3	2	2	3	3		2	2	3	2	3	2
	CO2	Recognize characteristic impedance, surge impedance, flat line etc.	1.4	2.3	1.6	3	3	3	2	2	2	3		2	2	3	2		2
	CO3	Develop tandem and parallel connection of transmission lines.	1.6	2.1	1.7	3	3	3	2	2	3	3		2	2	3	2		2
	CO4	Draw and analyze power circle diagram	2.3	2.1	2.3	3	3	3	2	2	2	3		2	2	3	2		2
	CO5	Figure out problems and solution of load frequency control and voltage control.	2.6	2.2	2.5	3	3	3	2	2	2	3		2	2	3	2		2
	CO6	Illustrate power system stability, faults, power system security, contingency, blackout occurring in power system and related calculations.	2.9	2.2	2.7	3	3	3	2	2	2	3		2	2	3	2		3
		BEEL606: Power System Analysis and Control																	
BEEL606	CO1	Generalized circuit constants of short, medium and long transmission line	3.0	2.2	2.8					2	3	3		2	2	3	2		2

	CO2	Simulate LG, LLG, LLL and LLLG faults.	3.0	2.0	2.8					3	2	3		2	2	3	2		2
	CO3	Compute given problem of load frequency control.	3.0	1.9	2.8					3	3	3		2	2	3	2		2
	CO4	Calculate specified problem of voltage control.	3.0	1.8	2.8					2	2	3		2	2	3	2	3	2
	CO5	Teamwork skills for working effectively in groups and develop analytical skills to compare experimental results with theoretical concepts	3.0	2.0	2.8					2	2	2							2
	CO6	List out different component of a distribution substation and their necessarily	3.0	1.9	2.8					2	2	3		2	2	3	2		2
			BEEL606 (LAB): Power System Analysis and Control																
BEEL 607: Minor Project	CO 1.	Formulate the real world problems.	3.0	2.2	2.8	2	2	2					3	3	3	3		3	3
	CO 2.	Express the technical ideas, strategies and methodologies.	3.0	2.1	2.8	2	2	2					3	3	3	3		3	3
	CO 3.	Utilize the new tools, algorithms, techniques to obtain solution of the project.	3.0	2.0	2.8	2	2	2					3	3	3	3		3	3
	CO 4.	Prepare oral demonstrations.	3.0	2.0	2.8								3	3	3	3		3	3
			BEEL 607: Minor Project																
BEES608/9 Self	CO 1.	Refer various technical recourses available from multiple field	3.0	2.2	2.8									3	3			3	3
	CO 2.	Adhere to deadlines and commitment to complete the assignment	3.0	2.3	2.9									3	3			3	3
	CO 3.	Improve his/her performance in self learning domain	3.0	2.0	2.8									3	3			3	3
	CO 4.	Acquire additional knowledge helpful for competitive examinations	3.0	2.0	2.8									3	3			3	3
			BEES608/9 Self Study, Seminar & Group Discussion																

semester 7	BEEL-701: Electric Drives	CO1	Describe various components of a drive system along with modes of operation, control needs and identify stable/unstable regions	3.0	2.1	2.8	3								3					
		CO2	Name the various controllers for AC/DC drives and draw their circuit diagrams	2.1	2.2	2.1	3	2				2				2				
		CO3	Classify, various drives & loads, their characteristics and control methods under various operating conditions	2.6	2.2	2.5		3			3	3				3	2		3	
		CO4	Develop mathematical models of various drives and compute various parameters	1.0	2.1	1.2	3			3	2						2		2	
		CO5	Suggest the various static converters for speed control of different types of drives	2.4	2.0	2.3	3						2				2			
		CO6	Explain the functioning of solar, battery powered and traction drives and explain energy conservation methods.	2.4	2.0	2.3	2	3	2		2		3		2	3	3	2		
			BEEL-701: Electric Drives																	
	BEEL-702: Switchgear & protection	CO1	Operate the Over/Under voltage & over current relays and observe the performance for different settings	3.0	2.1	2.8	3	2	2	2		2		2	1	1		2	2	2
		CO2	Compare the performance and working of electromechanical and static relays	2.1	2.2	2.1	2	3	2	2		3		2	1	1		1	3	2
		CO3	Simulate distance relays and plot their characteristics using MATLAB	2.6	2.2	2.5	2	2	2	3		3		3	1	1		1	2	2
		CO4	Explain the motor and feeder protection mechanism and their protection schemes	1.0	2.1	1.2	2	2	3	2	2	2		2	1	1		2	2	3
		CO5	Analyze the effect of time and current settings on the operating characteristics of an Inverse Definite Minimum Time (IDMT) relay	2.4	2.0	2.3	2	2	2	2	2	3		2	1	1		2	3	2

	CO3	Appreciate the ethical basis of professional practice in in relevant industry	3.0	2.7	2.9	2		3		2									2	
	CO4	Display a capacity for critical reasoning and independent learning	3.0	1.5	2.7	2			2										2	
	CO5	Exercise the role of the professional/specialist/manager/s upervisor confidently in the relevant industry	3.0	1.5	2.7		2			1									2	
	CO6	Write formatted report explaining the work in industrial training and describing the experience	3.0	2.2	2.8	2		1											2	
			BEEL706: Industrial Training & Internship																	
BEED707: Major Project I	CO1	Formulate the real world problems.	3.0	2.4	2.9	2	2	2						3	3	3	3		3	
	CO2	Express the technical ideas, strategies and methodologies.	3.0	2.4	2.9	2	2	2						3	3	3	3		3	
	CO3	Utilize the new tools, algorithms, techniques to obtain solution of the project.	3.0	1.9	2.8	2	2	2						3	3	3	3		3	2
	CO4	Test & validate the developed prototype/results.	3.0	2.3	2.9	2	2	2						3	3	3	3		3	
	CO5	Write a project report.	3.0	2.4	2.9									3	3	3	3		3	2
	CO6	Prepare oral demonstrations.	3.0	2.5	2.9									3	3	3	3		3	
			BEED707: Major Project I																	
BEES708 : Self Seminar &	CO 1.	Refer various technical recourses available from multiple field	3.0	2.2	2.8									3	3			3	3	
	CO 2.	Adhere to deadlines and commitment to complete the assignment	3.0	2.3	2.9									3	3			3	3	
	CO 3.	Improve his/her performance in self learning domain	3.0	2.0	2.8									3	3			3	3	
	CO 4.	Acquire additional knowledge helpful for competitive examinations	3.0	2.0	2.8									3	3			3	3	
			BEES708 : Self Seminar & Group Discussion																	

BEEL 701: Electrical Drives Lab	CO1	Compare the performance of converters with and without modulation	3.0	2.2	2.8	2	2	3	3									2
	CO2	Distinguish between the semi and full converter operations for resistive and reactive loads	3.0	2.3	2.9	2	2	3	3									2
	CO3	Analyse and plot the characteristics of different motors with changing parameters using MATLAB code	3.0	2.0	2.8	2	2	3	3									2
	CO4	Simulate the performance of various converters under different operating conditions using MATLAB/Simulink	3.0	2.0	2.8	2	2	3	3									2
	CO5	Comment on the advantages & limitations of various static switches used to realize converters	3.0	2.1	2.8	2	2	3	3									2
	CO6	Write technical Report	3.0	2.1	2.8	2	2	3	3			3	3					2
BEEL 701: Electrical Drives Lab																		
BEEL 702: Switchgear & Protection Lab	CO1	Operate the Over/Under voltage & over current relays and observe the performance for different settings	3.0	1.9	2.8	2	2	3	3									2
	CO2	Compare the performance and working of electromechanical and static relays	3.0	1.8	2.8	2	2	3	3									2
	CO3	Simulate distance relays and plot their characteristics using MATLAB	3.0	2.0	2.8	2	2	3	3									2
	CO4	Explain the motor and feeder protection mechanism and their protection schemes	3.0	2.0	2.8	2	2	3	3									2
	CO5	Analyze the effect of time and current settings on the operating characteristics of an Inverse Definite Minimum Time (IDMT) relay	3.0	1.9	2.8	2	2	3	3									2
	CO6	Validate the characteristics of percentage biased differential relay for different bias settings	3.0	1.9	2.8	2	2	3	3									2
BEEL 702: Switchgear & Protection Lab																		

semester 8	BEEL 801: Soft Computing Techniques	CO1	Define the concepts of soft computing techniques and their merits over conventional hard computing techniques	2.9	1.9	2.7				3	2	2			2	2	2		3	
		CO2	Compare various neural networks for pattern classification and regression problems	1.5	1.9	1.5				3						2	2	2		3
		CO3	Illustrate fuzzy logic and its importance to handle uncertainty	2.9	1.9	2.7	3			3						2	2	2		
		CO4	Describe the concept of evolutionary computation and genetic algorithms	1.4	1.9	1.5	3			3						2	2	2		
		CO5	Develop Hybrid systems using GA, PSO and ACO and apply them to solve optimization problems	1.5	1.9	1.5	3			3						2	2	2		
		CO6	Solve engineering problems using various neural networks, fuzzy logic and GA	2.3	1.9	2.2	3			3						2	2	2		
		BEEL 801: Soft Computing Techniques																		
	BEEL 801: Soft Computing Techniques (Lab)	CO1	Define the concepts of soft computing techniques and their merits over conventional hard computing techniques	2.9	1.9	2.7				3	2	2			2	2	2			3
		CO2	Compare various neural networks for pattern classification and regression problems	1.5	1.9	1.5				3						2	2	2		3
		CO3	Illustrate fuzzy logic and its importance to handle uncertainty	2.9	1.9	2.7	3			3						2	2	2		
		CO4	Describe the concept of evolutionary computation and genetic algorithms	1.4	1.9	1.5	3			3						2	2	2		
		CO5	Develop Hybrid systems using GA, PSO and ACO and apply them to solve optimization problems	1.5	1.9	1.5	3			3						2	2	2		
		CO6	Solve engineering problems using various neural networks, fuzzy logic and GA	2.3	1.9	2.2	3			3						2	2	2		

		measurement and control of industrial processes.																	
	CO5	Analyze, formulate and select suitable sensor for the given applications.	3.0	2.1	2.8	2	2	3	3									3	1
	CO6	Design various measurement schemes that meet the desired specifications and requirements of real time processes	2.4	2.1	2.3	2	2	3	3									3	2
		EEL803A: Process Instrumentation																	
BEEL804A: High Voltage Engineering	CO1	Recognize the basics of high voltage and its application	2.9	2.4	2.8	2	2												
	CO2	Appreciate the design, working principles and critical elements of a high voltage system	2.2	2.2	2.2	2	2												
	CO3	Identify solutions for various engineering problems related to high voltage engineering.	2.7	2.2	2.6	2	2	3	3									3	3
	CO4	Enumerate the generation & measurement techniques for high ac, dc and impulse voltages & currents	1.4	2.4	1.6	2	2	3	3									3	2
	CO5	Explain the behaviour of insulating materials under the stress of high electrical voltage.	1.8	2.4	1.9	2	2	3	3									3	2
	CO6	Justify the planning, operation, testing and maintenance of high voltage equipment and systems.	2.3	2.2	2.2	2	2	3	3									3	2
		BEEL804A: High Voltage Engineering																	
BEEL 805: Major	CO 1.	Formulate the real world problems.	3.0	2.4	2.9	2	2	2					3	3	3	3		3	3
	CO 2.	Express the technical ideas, strategies and methodologies.	3.0	2.4	2.9	2	2	2					3	3	3	3		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					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
	CO 5.	Write a project report.	3.0	2.4	2.9								3	3	3	3		3	3
	CO 6.	Prepare oral demonstrations.	3.0	2.5	2.9								3	3	3	3		3	3
	BEEL 805: Major Project																		
BEEL 806: Electrical Industrial Safety &	CO 1.	Utilise any special equipment, with proper safety and norms	3.0	2.4	2.9	2	2	2					3	3	3	3		3	3
	CO 2.	Innovate new society required technology, which would be cost competitive	3.0	2.1	2.8	2	2	2					3	3	3	3		3	3
	CO 3.	Participate in , make in India, theme and hence reduce the import dependency	3.0	1.5	2.7	2	2	2					3	3	3	3		3	3
	CO 4.	Develop team spirit among man machine and material	3.0	1.6	2.7	2	2	2					3	3	3	3		3	3
	CO 5.	Reduce the chances of any accident, causality, damage	3.0	2.0	2.8								3	3	3	3		3	3
	CO 6.	Pioneer in industrial entrepreneurship/start-up/projects	3.0	1.7	2.7								3	3	3	3		3	3
	BEEL 806: Electrical Industrial Safety & Maintenance																		