MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY BATHINDA-151001 (PUNJAB), INDIA

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Department: **ELECTRICAL ENGINEERING**
Giani Zail Singh Campus College of Engineering & Technology, MRSPTU

Program: B Tech ELECTRICAL ENGG.

COURSE ARTICULATION MATRIX

Subject	Sub Code	Sem	Credit	Duration	L T P	CO No.	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BASIC ELECTRICAL ENGINEERING	**BELEE0-101**	**1**	**4**	**42**	**3 1 0**	CO1.	To understand and analyze basic DC and AC circuits	2	3										1			3
						CO2.	To study the use and working principle of single phase transformers	2					3						1	3		
						CO3.	To study the application and working principles of three phase and single phase induction motors.	2					3						1	3		
						CO4.	To introduce to the components of low voltage electrical installations	2					3						1	3		

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BASIC ELECTRICAL ENGINEERING LAB	**BELEE0-102**	**1**	**1**		**0 0 2**	CO1.	Get an exposure to common electrical components and their ratings	2					3			2			1		3	
						CO2.	Make electrical connections by wires of appropriate ratings	2					3			2			1	2	3	
						CO3.	Understand the usage of common electrical measuring instruments	2					3			2			1		3	
						CO4.	Understand the basic characteristics of transformers and electrical induction motors	2					3			2			1		2	3
ELECTRICAL CIRCUIT ANALYSIS	**BELES1-301**	**3**	**4**	**60**	**3 1 0**	CO1.	Apply network theorems for the analysis of electrical circuits	1	3		2								1		3	1
						CO2.	Obtain the transient and steady-state response of electrical circuits.	1	3		2								1		3	1
						CO3.	Analyze circuits in the sinusoidal steady-state (single-phase and three-phase).	1	3		2								1		3	1
						CO4.	Analyze two-port circuit behavior	1	3		2								1		3	1
ANALOG ELECTRONIC CIRCUITS	**BELES1-302**	**3**	**3**	**45**	**3 0 0**	CO1.	Understand the characteristics of transistors	2					1						1		3	
						CO2.	Design and analyze various rectifier and amplifier circuits.	1	3	3			1						1	3	2	
						CO3.	Design sinusoidal and non-sinusoidal oscillators.	1		3			1						1	3	2	
						CO4.	Understand the functioning of OP-AMP and design OP-AMP based circuits	2		3			1						1	3	2	

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ELECTRICAL MACHINES – I	**BELES1-304**	**3**	**4**	**60**	**3 1 0**	CO1.	Understand the concepts of magnetic circuits.	3					1						1			1
						CO2.	Understand the operation of D.C. machines	3					1						1	3		
						CO3.	Analyze the differences in operation of different D.C. machine configurations.	1	3				1						1	3		
						CO4.	Analyze single phase and three phase transformers circuits.	1	3				1						1		3	
ELECTRICAL MACHINES LAB - I	**BELES1-305**	**3**	**1**		**0 0 2**	CO1.	To acquire skills to operate all types of D.C. machines.	3					3			1			1	3		1
						CO2.	Ability to analyze the speed control methods and efficiency of DC machines	1	3			1	2			1			1	2	3	1
						CO3.	To be able to compute efficiency and voltage regulation of transformers.	1	2				3			1			1	2	3	1
ELECTROMAGNETIC FIELDS	**BELES1-306**	**3**	**4**	**60**	**3 1 0**	CO1.	To understand the basic laws of electromagnetism.	3											1		1	1
						CO2.	To obtain the electric and magnetic fields for simple configurations under static conditions	2	3										1		3	1
						CO3.	To analyze time varying electric and magnetic fields.	2	3										1		3	1
						CO4.	To understand Maxwell's equation in different forms and different media	3	2		1								1		3	1
						CO5.	To understand the propagation of EM waves.	3	2		1								1		3	1

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ENGINEERING MECHANICS	**BMECE0-001**	**3**	**4**	**60**	**3 1 0**	CO1.	Kinematics of particles	2	3				1						1		3	1
						CO2.	Co-planar and concurrent forces	2	3				1						1		3	1
						CO3.	Solids mechanics	2	3				1						1		3	1
						CO4.	Moment of inertia and center of gravity	2	3		1		1						1		3	1
						CO5.	Role of friction in screw Jack and inclined planes	2	3	1	2		1						1		3	1
ENVIRONMENTAL SCIENCES	**BMNCC0-002**	**3**	**0**		**2 0 0**	CO1.	To identify global environmental problems arising due to various engineering/industrial and technological activities and the science behind these problems.	1	2		3		2	3					1		3	1
						CO2.	To realize the importance of eco-system and bio-diversity for maintaining ecological balance	1	2				2	3					1	3		1
						CO3.	To identify the major pollutants and abatement devices for environmental management and sustainable development	1			3		2	3					1	3		1
						CO4.	To estimate the current world population scenario and thus calculating the economic growth, energy requirement and demand.	1	2		3		2	3					1		3	1
						CO5.	To understand the conceptual process related with the various climatologically associated problems and their plausible solutions.	1	2	3	3		2	3					1		3	1

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DIGITAL ELECTRONICS	**BELES1-401**	**4**	**3**	**45**	**3 0 0**	CO1.	Understand working of logic families and logic gates.	3					1						1		3	1
						CO2.	Design and implement Combinational and Sequential logic circuits.	2		3			1						1	3	2	1
						CO3.	Understand the process of Analog to Digital conversion and Digital to Analog conversion	3					1						1		3	1
						CO4.	Be able to use PLDs to implement the given logical problem	3		3			1						1	3		1
DIGITAL ELECTRONICS LAB	**BELES1-402**	**4**	**1**		**0 0 2**	CO1.	To give students a practical knowledge about various types of gates and verify their truth tables.	3					1			1			1	3		1
						CO2.	To give students a working knowledge to connect digital circuits and verify their truth tables.	3					1			1			1	3		1
						CO3.	To give students knowledge of working of different combinational and sequential circuits.	3					1			1			1	3		1
ELECTRICAL MACHINES –II	**BELES1-403**	**4**	**4**	**60**	**3 1 0**	CO1.	Understand the concepts of rotating magnetic fields	3	2										1		3	1
						CO2.	Understand the operation of AC machines.	3	**2**				3						1	3		1
						CO3.	Analyze performance characteristics of AC machines	2	**3**				1						1		3	1

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ELECTRICAL MACHINE-II LAB	**BELES1-404**	**4**	**1**		**0 0 2**	CO1.	Obtain equivalent circuit parameters of single-phase and three- phase Induction motors	1	2	**3**						1			1		3	1
						CO2.	Control speed of Induction motors by different methods	1	2	3		**1**	3			1			1	3		1
						CO3.	Draw open and short circuit characteristics of three-phase alternator and V and inverted V curves of synchronous motor	1	2				3			1			1		3	1
						CO4.	Find out voltage regulation of an alternator by different tests.	1	**3**				3			1			1		3	1
						CO5.	Synchronize two or more 3-phase alternators.	1	2	2	2	**1**	3			1			1	3		1
POWER ELECTRONICS	**BELES1-405**	**4**	**3**	**45**	**3 0 0**	CO1.	Understand the differences between signal level and power level devices	**3**	2				1						1	3		1
						CO2.	Analyze controlled rectifier circuits.	2	**3**				3						1		3	1
						CO3.	Analyze the operation of DC-DC choppers	2	**3**				3						1		3	1
						CO4.	Analyze the operation of voltage source inverters.	2	**3**				3						1		3	1

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POWER ELECTRONICS LAB	**BELES1-406**	**4**	**1**		**0 0 2**	CO1.	Students will be able to verify the characteristics of SCR and UJT and triggering pulses for them.	2	2							1			1		3	1
						CO2.	They will be able to visualize and analyze the performance of various converter circuits.	**2**	**3**				3			**1**			1		3	1
						CO3.	They will be able to control the speed of motors using thyristors	2	2		**2**	**3**	3			1			1	3		1
SIGNALS & SYSTEMS	**BELES1-407**	**4**	**4**	**60**	**3 1 0**	CO1.	Understand the concepts of continuous time and discrete time systems	3	2										1		3	1
						CO2.	Analyze systems in complex frequency domain.	2	3										1		3	1
						CO3.	Understand sampling theorem and its implications.	2	2	3	2	2							1	3	2	1
POWER SYSTEMS - I	**BELES1-501**	**5**	**4**	**60**	**3 1 0**	**CO1.**	To choose working voltage and economic size of conductors for transmission and distribution systems	**3**	**2**		**1**		1	**1**					1	3		1
						CO2.	To analyze performance of transmission lines and underground cables	**1**	**3**										1		3	1
						CO3.	To select and design overhead line insulators and transmission lines.	1	**2**	**3**			1						1	3		1

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CONTROL SYSTEMS	**BELES1-502**	**5**	**4**	**60**	**3 1 0**	CO1.	To do modeling of linear-time-invariant systems using transfer function and state-space representations	1	2	3	2	2							1		3	1
						CO2.	To do the stability assessment for linear-time invariant systems	1	3	2	2	2							1		3	1
						CO3.	To design simple feedback controllers.	1	2	3	2	2	2						1	3		1
MICROCONTROLLERS AND PLC	**BELES1-503**	**5**	**3**	**45**	**3 0 0**	CO1.	Know about the architecture, operation and instruction set of 8051 microcontroller	3											1	3		1
						CO2.	Be able to do programming of 8051 microcontrollers	2		3									1		3	1
						CO3.	Be able to Interface 8051 with peripheral devices.	2		3			3						1	3		1
							Be able to use PLCs.	1		3			3						1	3		1
POWER SYSTEMS – I LABORATORY	**BELES1-504**	**5**	**1**		**0 0 2**	CO1.	Students will have more detailed insight about the need of various equipment used for transmission and distribution of power	3					3			1			1	3		1
						CO2.	They will be able to draw performance characteristics of these equipment	2	**3**							1			1		3	1
						CO3.	To practically compute parameters and performance of transmission lines and feeders	2	**3**							1			1		3	1

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CONTROL SYSTEMS LABORATORY	**BELES1-505**	**5**	**1**		**0 0 2**	CO1.	To understand the basics of MATLAB software.	3								1			1		1	1
						CO2.	To understand variety of control system strategies.	3	1				2			1			1		3	1
						CO3.	To acquire skills to understand all types of control components.	3					2			1			1		3	1
						CO4.	Ability to analyze the stability of control systems		3							1			1		3	1
MICROCONTROLLER AND PLC Lab	**BELES1-506**	**5**	**1**		**0 0 2**	CO1.	Become familiar with the microcontrollers and PLCs.	3					3						1	3		1
						CO2.	Be able to write assembly language programs for various types of applications	2		3						1			1	3	2	1
						CO3.	Become familiar with the use of PLCs in industry	2		3			3			1			1	3		1
ELECTRICAL DRIVES	**BELED1-511**	**5**	**3**	**45**	**3 0 0**	CO1.	To draw the characteristics of DC motors and induction motors.	2	**3**	**1**									1		3	1
						CO2.	To control the speed of DC motors using power electronic converters.	**2**		3		**1**	3						1	3		1
						CO3.	To use power electronic converters for induction motor speed control	**2**				**1**	3						1	3		1
ELECTRICAL MACHINE DESIGN	**BELED1-512**	**5**	**3**	**45**	**3 0 0**	CO1.	Know the constructional features.	**3**					2						1	3		1
						CO2.	Be able to evaluate performance characteristics of electrical machines	2	**3**				1						1		3	1
						CO3.	Be able to carry out a basic design of an ac machine	2		**3**		2	2						1	3		1
						CO4.	Be able to use software tools to do design calculations	2		**3**		**2**							1	3		1

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ELECTROMAGNETIC WAVES	**BELED1-513**	**5**	**3**	**45**	**3 0 0**	CO1.	Provide solution to real life plane wave problems for various boundary conditions.	2	2		3		1						1		3	1
						CO2.	Visualize TE and TM mode patterns of field distributions in a rectangular wave-guide	2	3		1								1		3	1
						CO3.	Analyze wave-guides and understand radiation by antennas.	2	3		1	1	1						1		3	1
ECONOMICS FOR ENGINEERS	**BHSMC0-019**	**5**	**3**	**45**	**3 0 0**	CO1.	Able to analyze the demand and supply conditions of the market and accordingly assess the position of a company	**2**	**3**	**3**			3					1	1	3	3	3
						CO2.	Understand the basic economic problems faced by the society and make effective decisions	2	2	3	3		**3**					1	1	3	3	3
						CO3.	Design competition strategies, which includes costing, pricing, product differentiation, and market environment according to the natures of products and the structures of the markets	2	**2**	**3**			3					1	1	3	3	3
						CO4.	Analyze the market competitions and design strategies accordingly	2	3	3			3					1	1	3	3	3
POWER SYSTEMS-II	**BELES1-601**	**6**	**3**	**45**	**3 0 0**	CO1.	Explain causes and effects of faults, components used for power system protection such as; isolators and fuses, relays, circuit breakers etc.	3	3		3		3						1	3	3	1
						CO2.	Classify types of relays and circuit breakers and explain their working principles and operation.	3	2				3						1	3		1

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						CO3.	Protect transmission lines, feeders, bus bars, generator and transformer	3		2			3						1	3		1
						CO4.	Develop concepts about the basic principles of static and digital protection.	2				3							1	3		1
ELECTRICAL MEASUREMENTS & INSTRUMENTATION	**BELES1-602**	**6**	**3**	**45**	**3 0 0**	CO1.	To explain the constructional features, characteristics and operation of various measurement devices and transducers	3	2				1						1	3	2	1
						CO2.	To measure R, L and C using DC and AC bridges	1	2	3			1						1		3	1
						CO3.	To use CRO and instrument transformers for measurement and instrumentation purposes	1	2	3			1						1	3		1
						CO4.	To select transducers for different applications.	1	2	3			1						1	3		1
POWER SYSTEMS-II Lab	**BELES1-603**	**6**	**1**		**0 0 2**	CO1.	To demonstrate operation of relays and circuit breakers	3								1			1	3		1
						CO2.	To analyze various protection schemes in power system.	2	3				1			1			1	3	3	1
						CO3.	To plot characteristics of various types of relays, circuit breakers and fuses	2	3				1			1			1		3	1
MEASUREMENTS & INSTRUMENT	**BELES1-604**	**6**	**1**		**0 0 2**	CO1.	To apply the basic measurement techniques and use measuring instruments.	2	1	3			1						1	3	2	1
						CO2.	To measure various electrical quantities using various types of meters.	2		3			1						1	3		1

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						CO3.	To practically use current and potential transformers, CRO and DSO	2		3			1						1	3		1
ELECTRICAL DESIGN & ESTIMATION LAB	**BELES1-605**	**6**	**1**		**0 0 2**	CO1.	To estimate the cost of various types of electrical installations.	2	3				1			1			1	3	2	1
						CO2.	To identify design goals and analyze possible approaches to meet given specifications with realistic engineering constraints.	2	3	3	3		2			3			1	3	3	1
						CO3.	To use modern engineering software tools.	2				3							1		3	1
						CO4.	To work amicably as a member of an engineering design team	2		3						3			1	3		1
INDUSTRIAL ELECTRICAL SYSTEMS	**BELED1-611**	**6**	**3**	**45**	**3 0 0**	CO1.	To represent the electrical wiring systems for residential, commercial and industrial consumers with standard symbols and drawings, SLD	3					1						1	3		1
						CO2.	To explain various components of industrial electrical systems.	3					1						1	3		1
						CO3.	To analyze and select the proper size of various electrical system components	2	2	3			2						1	3	3	1
NON-LINEAR & DIGITAL CONTROL	**BELED1-612**	**6**	**3**	**45**	**3 0 0**	CO1.	Represent discrete LTI systems	3											1		3	1
						CO2.	Analyze stability of open loop and closed loop discrete-time systems		3										1		3	1
						CO3.	Design and analyze digital controllers		2	3			2						1	3	3	1
						CO4.	Design state feedback and output feedback controllers			3			2						1	3		1

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COMPUTER ARCHITECTURE	**BELED1-613**	**6**	**3**	**45**	**3 0 0**	CO1.	Organize a modern computer system and be able to relate it to real examples	2		3			1						1	3	2	1
						CO2.	Write efficient programs in assembly language of the 8086 family of microprocessors	2		3									1	2	3	1
						CO3.	Develop the programs in assembly language for 80286, 80386 and MIPS processors in real and protected modes.	2		3		1							1	2	3	1
COMPUTATIO NAL ELECTROMA	**BELED1-614**	**6**	**3**	**45**	**3 0 0**	CO1.	Explain the basic concepts of electromagnetics	3											1		3	1
						CO2.	Use computational techniques for electromagnetic fields	2	3										1		3	1
						CO3.	Apply the techniques to simple real-life problems	2		3			1						1	3		1
WIND & SOLAR ENERGY SYSTEMS	**BELED1-621**	**6**	**3**	**45**	**3 0 0**	CO1.	To explain the basics of wind power generation	3					1						1		3	1
						CO2.	To elaborate the basics of solar power generation	3					1						1		3	1
						CO3.	To interpret the network integration issues and the power electronic interfaces for wind and solar generation	2	3	2	3		1						1	3		1
HVDC TRANSMISSION SYSTEMS	**BELED1-622**	**6**	**3**	**45**	**3 0 0**	CO1.	To know the advantages of DC transmission over AC transmission	3											1		3	1
						CO2.	To explain the operation of Line Commutated Converters and Voltage Source converters	3	1										1		3	1
						CO3.	To apply control strategies used for HVDC transmission system	2		3			1						1	3		1

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						CO4.	To improve power system stability using HVDC system	2		3	2		1						1	2	3	1
EHVAC TRANSMISSION SYSTEMS	**BELED1-623**	**6**	**3**	**45**	**3 0 0**	CO1.	To explain the advantages of EHVAC Transmission and problems associated with it.	3	1				1						1		3	1
						CO2.	To examine the reactive parameters of lines and use methods of voltage control	2	2	3			2						1	1	3	2
						CO3.	To compute the voltage gradients of conductors and explain the associated bad effects of corona.	2	3		2		1	1					1		3	1
FACTS DEVICES IN TRANSMISSION & DISTRIBUTION	**BELED1-624**	**6**	**3**	**45**	**3 0 0**	CO1.	To analyze the characteristics of AC transmission	2	3										1		3	1
						CO2.	To explain the effect of shunt and series reactive power compensation	2	3										1		3	1
						CO3.	To apply FACTS devices to control power flow and to improve power quality	2		3	2		2						1	3		1
INTRODUCTION TO INDUSTRIAL MANAGEMENT	**BELES1-606**	**6**	**3**	**45**	**3 0 0**	CO1.	Understand the theories and principles of modern management	3					2					1	1	3	3	1
						CO2.	Apply the concepts to the management of organizations in private and public sector	2		3			3					3	1	3		1
						CO3.	Plot and analyze inventory control models and techniques.	2	3				1						1	3	3	1
						CO4.	Understand JIT, MRP and Six Sigma	3					1						1		3	1

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POWER SYSTEM ANALYSIS	**BELES1-701**	**7**	**3**	**45**	**3 0 0**	CO1.	Develop per unit system models of synchronous machines, transformers, transmission lines and static loads for power system studies	2		**3**									1		3	1
						CO2.	Perform load flow studies by using bus admittance matrix and to do fault analysis by bus impedance matrix	2	**3**		**1**								1		3	1
						CO3.	Compare features of Gauss-Siedel, Newton-Raphson and Decoupled methods of load flow analysis.	2	**3**										1		3	1
						CO4.	Analyze the effect of symmetrical and unsymmetrical faults on power system	2	**3**		**3**		1						1	2	3	1
						CO5.	Analyze the effect of small and large disturbances on power system stability	2	**3**		**3**		1						1	2	3	1
INTRODUCTION TO INDUSTRY	**BELES1-702**	**7**	**2**		**2 0 0**	CO1.	Understanding about the emerging demands of the industry	**3**	2				**3**						1	3		1
						CO2.	To develop an insight about the better human-machine interface	2	2			2	**3**						1		3	1
POWER SYSTEM ANALYSIS LAB	**BELES1-703**	**7**	**1**		**0 0 2**	CO1.	Ability to develop software programs for bus matrices	1		**3**		2							1		3	1
						CO2.	Capability to develop or use software programs for load flow analysis	1	2	**3**	2	**2**	1						1		3	1
						CO3.	Ability to compute fault currents	1	**3**		**2**		1						1		3	1

Subject	Sub Code	Sem	Credit	Duration	L T P	CO No.	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MINOR PROJECT	**BELES1-704**	**7**	**2**		**0 0 4**	CO1.	Student will be able to apply the theoretical and practical knowledge gained so far, by taking up the study in the form of a project work			3	2	1	1			3		3	1	3		1
						CO2.	This study is expected to provide a good initiation for the students in R&D work			3	2	1	1			3		3	1		3	1
HIGH VOLTAGE ENGINEERING	**BELED1-711**	**7**	**3**	**45**	**3 0 0**	CO1.	Knowledge of generation and measurement of DC, AC, & Impulse voltages	**3**											1	3		1
						CO2.	Knowledge of tests on HV equipment and on insulating materials as per the standards	**3**					3						1	3		1
						CO3.	Knowledge of how over-voltages arise in a power system and protection against these over-voltages.	**3**	**3**	3			3						1	3	2	1
ELECTRICAL & HYBRID VEHICLES	**BELED1-712**	**7**	**3**	**45**	**3 0 0**	CO1.	Develop mathematical models to describe vehicle performance	2		**3**									1		3	1
						CO2.	Analyze fuel efficiency of hybrid and electric drive trains	2	**3**				2	1					1		3	1
						CO3.	Control various types of drives.	2		3	**3**		3						1	3		1
						CO4.	Analyze different types of energy storage systems	2	**3**				**2**						1	2	3	1
						CO5.	Select the size of a drive system and Implement energy management strategies	2		**3**	**3**		3	1					1	3		1
UCTION TO DIGITAL	**BELED1-**	**7**	**3**	**45**	**3 0 0**	CO1.	To classify relays, such as; electromechanical, static and numerical relays and describe their merits and de-merits	3	3				2						1	3		1

Subject	Sub Code	Sem	Credit	Duration	L T P	CO No.	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
						CO2.	To explain the need of numerical relaying algorithms.	2	**3**										1		3	1
						CO3.	To explain the basic block diagram of a digital protection system	3	**2**										1		3	1
						CO4.	To interface elements with microprocessor to develop digital relays	3		3	2		3						1	3		1
DIGITAL SIGNAL PROCESSING	**BELED1-714**	**7**	**3**	**45**	**3 0 0**	CO1.	To represent signals mathematically in discrete-time, and in the frequency domain and analyze them using Z-transform	2	3	**3**									1		3	1
						CO2.	To implement Discrete Time Systems using the Discrete-Fourier Transform (DFT) and the FFT algorithms.	2		3									1		3	1
						CO3.	To design digital filters for various applications	2		3		1	3						1	3		1
						CO4.	To apply digital signal processing for the analysis of real-life signals	2	3	3		1	1						1	3	3	1
PROJECT MANAGEMENT & ENTREPRENEURSHIP	**BHSMC0-024**	**7**	**3**	**45**	**3 0 0**	CO1.	Understand project characteristics and various stages of a project	3	3				1					3	1	3	2	1
						CO2.	Analyze the learning and understand techniques for Project planning, scheduling and Execution Control.	3	3			1	3					3	1	3	2	1
						CO3.	Know the parameters to assess opportunities and constraints for new business ideas	3			3		2					3	1	3	2	1

Subject	Sub Code	Sem	Credit	Duration	L T P	CO No.	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
						CO4.	Understand the systematic process to select and screen a business idea	3	2	3			2					3	1	3	2	1
						CO5.	Understand various funding opportunities available for start-up and new ventures	3	2	1			3					3	1	3	2	1
GENERATION & ECONOMICS OF ELECTRIC POWER	**BELES1- 801**	**8**	**3**	**45**	**3 0 0**	CO1.	Students will be able to differentiate among types of loads and related terminology	2	**3**				1						1		3	1
						CO2.	They will be able to estimate various costs involved in the power plants and tariffs imposed on different categories of consumers	2	**3**				3					2	1	3	2	1
						CO3.	They can select the size and location of a power plant	2		**3**	**2**		3	2				2	1	3		1
						CO4.	They will be enabled to co-operate hydro and steam power plants	2		**3**	2		3	2				2	1	3	2	1
MAJOR PROJECT	**BELES1 - 802**	**8**	**4**		**0 0 8**	CO1.	Student will be trained to apply the theoretical knowledge and practical experience gained so far, by conducting the study in the form of a project work.		1	3	2		**1**			3	2	**2**	1	3		1
						CO2.	Students will get a good training in R&D work and technical leadership		**1**	3	**2**		1			3		2	1		3	1
CONSER LE R1		**8**	**3**	**45**	**3 0 0**	CO1.	To do management and audit of energy.	3	2		1	1	**3**	3				**1**	1	3	2	1

Subject	Sub Code	Sem	Credit	Duration	L T P	CO No.	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
						CO2.	To calculate different types of losses and hence evaluate and improve energy efficiency of electrical systems	2	3	3	3		3	3				1	1	3	2	1
						CO3.	To evaluate performance and efficiency of HVAC systems, fans, blowers, pumps, compressed air systems and cooling towers	2	3		3		3	3				1	1	3	2	1
POWER SYSTEM DYNAMICS & CONTROL	**BELED1- 812**	**8**	**3**	**45**	**3 0 0**	CO1.	To evaluate the impact of stability on the operation and control of power system	2	3		2		3						1		3	1
						CO2.	To analyze linear dynamical systems and can apply numerical integration methods	2	3	3		3							1		3	1
						CO3.	To model different power system components for the study of stability	2		3		3							1		3	1
						CO4.	To use methods to improve stability	2		3			3						1	3		1
CONTROL SYSTEMS DESIGN	**BELED1- 813**	**8**	**3**	**45**	**3 0 0**	CO1.	Design classical control systems in time domain.	2		3		1	1						1	3		1
						CO2.	Design classical control systems in frequency domain.	2		3		1	1						1	3		1
						CO3.	Design controller structures (P, PI, PID, compensators).	2		3		1	1						1	3		1
						CO4.	Examine the controllability & observability and can design controllers using state-space approach	2		3	3	1	1						1	3	3	1

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ELECTRIC ADVANCED DRIVES	**BELED1- 814**	**8**	**3**	**45**	**3 0 0**	CO1.	Understanding about the control of power converters and their control methods	3	2	**3**	3								1	3	2	1
						CO2.	Control power converters for controlling AC drives	3		3	3	**3**	3						1	3		1
						CO3.	Apply the various control techniques for induction motor drives and synchronous motor drives	3		3	**3**	**3**	3						1	3		1
						CO4.	Control motion using digital signal processors	3				3	3						1	3		1
POWER OF RESTRUCTURING INDUSTRY	**BELED1- 815**	**8**	**3**	**45**	**3 0 0**	CO1.	Students will be enabled to identify the need of restructuring and deregulation of power industry	**3**	**3**				3						1	3		1
						CO2.	They will be able to manage congestion of transmission network.	**3**			3		**3**					1	1	3	2	1
						CO3.	They will be able to estimate pricing of transmission network	**2**	**3**	2			**3**					1	1	3	2	1
						CO4.	Define and describe the Technical and Non-technical issues in restructured power industry	3			3		3	1					1	2	3	1

Enter Correction levels 1, 2 or 3 as defined below:

1. Slight (Low) - upto 30% 2. Moderate (Medium) – above 30% and upto70% 3. Substantial (High) – above 70%