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Sri Adichunchanagiri Shikshana Trust (R)

SJB Institute of Technology

BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
Approved by AICTE, New Delhi.

Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi

Accredited by NAAC with 'A+' grade, Certified by ISO 9001 – 2015

Recognized by UGC, New Delhi with 2(f) & 12 (B)

Department of Electrical and Electronics Engineering

(Accredited by NBA)



Course Outcomes and CO-PO-PSO articulation Matrix

Batch: 2021-25

Semester-I/II

Subject: Basic Electrical Engineering												Subject Code: 21ELE23			
Course Outcomes															
CO1	Analyze basic DC and AC electric circuits.														
CO2	Explain the working principles and performance of transformers and electrical machines.														
CO3	Discuss the concepts of electric power transmission and distribution of power.														
CO4	Understand the electricity billing, working principles of circuit protective devices and personal safety measures.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3											3	2	
CO2	3	3											3	2	
CO3	3												3	2	
CO4	3					2		2					2		
Avg.	3					2							3	2	

Subject: Basic Electrical Engineering Lab												Subject Code:21ELEL27			
Course Outcomes															
CO1	Analyze and verify the Kirchhoff's law, Maximum power transfer theorem, open circuit and short circuit condition for simple electrical circuit.														
CO2	Evaluate Impedance, Power and Power factor of a single phase and three phase load.														
CO3	Determine an earth resistance and to demonstrate the controlling of lamp.														
CO4	Determine efficiency of Single-phase transformer.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2				1				1			2	1	
CO2	2	2				1				1			2	1	
CO3	2	1				1	1	1		1			2	1	
CO4	2	2				1				1			2	1	
Avg.	2	1.75				1	1	1		1			2	1	

Semester-III

Subject: Transform Calculus, Fourier Series and Numerical Techniques												Subject Code: 21MAT31				
Course Outcomes																
CO1	To solve ordinary differential equations using Laplace transform.															
CO2	Demonstrate the Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.															
CO3	To use Fourier transforms to analyze problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations.															
CO4	To solve mathematical models represented by initial or boundary value problems involving partial differential equations.															
CO5	Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2	1									1				
CO2	3	2	1									1				
CO3	3	2	1									1				
CO4	3	2	1									1				
CO5	3	2	1									1				
Avg.	3	2	1									1				

Subject: Analog Electronics Circuits												Subject Code: 21EE32				
Course Outcomes																
CO1	Study of Diode Circuits and Transistors at low frequency.															
CO2	Design and analyze Multistage, Feedback and Power amplifier Circuits.															
CO3	Design and analyze Op-amp based Filters, Signal generators, comparators and converters.															
CO4	Study of Op-amp Applications and DC Voltage Regulators.															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2							1			1			2	
CO2	3	2	2						1			1			2	
CO3	3	2	2						1			1			2	
CO4	3	2							1			1			2	
Avg.	3	2	2						1			1			2	

Subject: Electrical Circuit Analysis												Subject Code: 21EE33				
Course Outcomes																
CO1	Understand the basic concepts, basic laws and methods of analysis of DC and AC networks															
CO2	Solve complex electric circuits using network theorems															
CO3	Analyze the resonant series and parallel circuits and discuss transient analysis of RL and RC circuit Switching action with evaluation of Initial conditions															
CO4	Synthesize typical waveforms using Laplace transformation															
CO5	Solve unbalanced three phase systems and also evaluate the performance of two port networks.															

CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3							2	2					3
CO2	3	3							2	2					3
CO3	3	3							2	2					3
CO4	3	1							2	2					2
CO5	3	2							2	2					2
Avg.	3	2.4							2	2					2.6

Subject: Transformers & Generators												Subject Code:21EE34			
Course Outcomes															
CO1	Understanding the construction and operation of transformers and autotransformers.														
CO2	Explain the performance of transformer by various tests, phase conversion and parallel operation.														
CO3	Analyze and explain the operation of the DC Generator, synchronous machine connected to infinite machine.														
CO4	Compare and analyze the performance of Synchronous machines by various tests, parallel operation, and performance of Synchronous machines on infinite bus														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1			1	1	3					3	2	
CO2	3	2	1			1	1	3					3	2	
CO3	3	3	1			1	1	3					3	2	
CO4	3	3	1			1	1	3					3	2	
Avg.	3	2.5	1			1	1	3					3	2	

Subject: Electrical Machines Lab-1												Subject Code: 21EEL35			
Course Outcomes															
CO1	Conduct different tests on transformers to evaluate the performance characteristics of the 1-phase and 3-phase transformers.														
CO2	Connect and operate transformers of different KVA rating in parallel and connect three transformers for three phase operation and phase conversion.														
CO3	Compute the voltage regulation of synchronous generator using the test data obtained in the laboratory and also evaluate the performance of synchronous generators from the test data.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	2		1			1	1			3	2	
CO2	3	2	2	2		1			1	1			3	2	
CO3	3	2	2	2		1			1	1			3	2	
Avg.	3	2	2	2		1			1	1			3	2	

Subject: Social Connect & Responsibility											Subject Code: 21SCR36				
Course Outcomes															
CO1	Understand social concerns and address it sensibly.														
CO2	Practice sustainability and creativity														
CO3	Showcase planning and organizational skills														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1						3	3	2	2	2	1	3			
CO2						3	3	3	3	2	1	3			
CO3						3	3	3	3	2	1	3			
Avg.						3	3	2.67	2.67	2	1	3			

Subject: Scilab for Transformers & Generators											Subject Code: 21EEL381				
Course Outcomes															
CO1	Develop a program learning new techniques, using Scilab software package in an intelligent manner to conduct different tests on transformers to evaluate the performance characteristics.														
CO2	Compute the voltage regulation of synchronous generator and evaluate the performance of synchronous generators effectively using Scilab software.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	2	3				1	1			3	2	
CO2	3	2	2	2	3				1	1			3	2	
Avg.	3	2	2	2	3				1	1			3	2	

Semester-IV

Subject: COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS											Subject Code: 21MAT41				
Course Outcomes															
CO1	Use the concepts of an analytic function and complex potentials to solve the problems arising in electromagnetic field theory. Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing														
CO2	Obtain Series Solutions of Ordinary Differential Equation.														
CO3	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.														
CO4	Apply discrete and continuous probability distributions in analyzing the probability models arising in the engineering field.														
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1									1			
CO2	3	2	1									1			
CO3	3	2	1									1			
CO4	3	2	1									1			
CO5	3	2	1									1			
Avg.	3	2	1									1			

Subject: Digital System Design												Subject Code:21EE42				
Course Outcomes																
CO1	Solve problems based on different Boolean expression minimization Technique.															
CO2	Analyze and design Different Combinational circuits.															
CO3	Illustrate, analyze, and design different Sequential Circuits.															
CO4	Explain and analyze state machine models and the structure of Memories.															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	3				1	1	1							3	
CO2	3	3				1	1	1							3	
CO3	3	3				1	1	1							3	
CO4	3	3				1	1	1							2	
Avg.	3	3				1	1	1							2.75	

Subject: Microcontroller												Subject Code:21EE43				
Course Outcomes																
CO1	Discuss the architectural details of microcontrollers and understand instruction set.															
CO2	Develop and analyze the assembly and C language programs to facilitate the data movement, arithmetic, logical, branching operation and other operations															
CO3	Design and apply the knowledge of on-chip peripherals and also interface external hardware to microcontroller.															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2														2	
CO2	3	2			2										3	
CO3	2	2	2	1	2							1			3	
Avg.	2.3	2	2	1	2							1			2.7	

Subject: Electric Motors												Subject Code:21EE44				
Course Outcomes																
CO1	Describe the construction, operation and classification of DC Motor, AC motor and special purpose motors.															
CO2	Explain the methods of testing of DC machines and determine losses and efficiency.															
CO3	Explain the constructional features of Three Phase and Single-phase induction Motors and assess their performance.															
CO4	Explain the operation, speed control & starting methods of Synchronous motor and Induction motors.															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2										2	2	2		
CO2	3	3				2						2	2	2		
CO3	3	3										2	2	2		
CO4	3	3				2						2	2	2		
Avg.	3	2.67				2						2	2	2		

Subject: BIOLOGY FOR ENGINEERS												Subject Code: 21BE45				
Course Outcomes																
CO1	To familiarize the students with the basic biological concepts and their engineering applications															
CO2	To enable the students with an understanding of biodesign principles to create novel devices and structures															
CO3	To provide the students an appreciation of how biological systems can be re-designed as substitute products for natural systems															
CO4	To motivate the students develop the interdisciplinary vision of biological engineering															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2					1	2	1				1				
CO2	2					1	2	1				1				
CO3	2					1	2	1				1				
CO4	2					1	2	1				1				
Avg.	2					1	2	1				1				

Subject: Electric Machines Laboratory - 2												Subject Code: 21EEL46				
Course Outcomes																
CO1	Experiment with DC machines to pre-determine their performance characteristics and also control and analyze the speed of DC motor.															
CO2	Conduct different tests to pre-determine the performance characteristics of induction and synchronous motor															
CO3	Analyze and compare performance of induction motors by conducting load test on single phase and three phase induction motors															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	3				1			3	3			2	3		
CO2	3	3				1			3	3			2	3		
CO3	3	3				1			3	3			2	3		
Avg.	3	3				1			3	3			2	3		

Subject: Simulation of op-amp Circuits												Subject Code: 21EEL484				
Course Outcomes																
CO1	Design and analyse different Op-amp amplifiers, oscillators & generators, active filters.															
CO2	Construct and interpret Op-amp operators and convertors															
CO3	Formulate & analyse Op-amp as comparators and Schmitt trigger circuits															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2	3		2				2	1					2	
CO2	3	2	3		2				2	1					2	
CO3	3	2	3		2				2	1					2	
Avg.	3	2	3		2				2	1					2	

Subject: Universal Human Values	Subject Code: 21UH49
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Course Outcomes

CO1	Understand Value-based education towards the development of human consciousness and Self-exploration for the transformation in society.
CO2	Recognize the relevance of individual personality in harmony with society, nature and co-existence at all levels.
CO3	Apply Professional ethics through implications of Holistic understanding towards value-based life and profession.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1									2	2		3			
CO2						2	1	1	2	2		3			
CO3								3	2	2		3			
Avg.						2	1	2	2	2		3			

Subject: Inter/Intra Institutional Internships (SKD)	Subject Code: 21INT49
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Course Outcomes

CO1	Gain Practical experience and knowledge of the industry and professionals.
CO2	Develop and experience communication, interpersonal and other critical skills in technical fields.
CO3	Demonstrate the ability to assess and report the technical documents
CO4	Develop a greater understanding about carrier options to achieve carrier goals in the interested technical fields.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3		3			2	2	2		2	2	2	2
CO2	3	3	3					2	2	2		2	2	2	2
CO3	3	3	3					2	2	2		2	2	2	2
CO4	3	3	3					2	2	2		2	2	2	2
Avg.	3	3	3		3			2	2	2		2	2	2	2

Semester-V

Subject: Transmission & Distribution	Subject Code: 21EE51
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Course Outcomes

CO1	Explain transmission and distribution scheme, identify the importance of different transmission systems and types of conductors & insulators.
CO2	Analyze and compute parameters, performance of the overhead transmission line for different configurations.
CO3	Interpret corona, explain the use of underground cables.
CO4	Classify different types of distribution systems; examine its quality & reliability.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2				2							3		
CO2	3	3	2			2							3		
CO3	3	3	2			2							3		
CO4	3	3	2			2	2						3		
Avg.	3	2.75	2			2	2						3		

Subject: Control Systems												Subject Code: 21EE52				
Course Outcomes																
CO1	Model electrical and mechanical system using analogous system formulate transfer functions using block diagram and signal flow graphs and perform AC, DC servomotors and synchro-transmitter receiver pair.															
CO2	Examine the stability of control system, ability to determine transient and steady state time response and the performance of a given system in time and frequency domains															
CO3	Analyze stability analysis using Root locus, bode plots and Nyquist plots by Utilize software package and discrete components.															
CO4	Simulate the DC position and feedback control system to study the effect of P, PI, PD and PID controller and compensator on the step response of the system															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2				2							2	2		
CO2	3	2											2	2	2	
CO3	3	2											2	2	2	
CO4	3	2				2							2	2	2	
Avg.	3	2				2							2	2	2	

Subject: Power System Analysis-1												Subject Code:21EE53				
Course Outcomes																
CO1	Model the power system components & draw per unit impedance diagram of power system.															
CO2	Compute unbalanced phasors in terms of sequence components and develop sequence networks.															
CO3	Analyze three phase symmetrical, unsymmetrical faults and selection of circuit breaker rating.															
CO4	Inspect dynamics of synchronous machine and determine the power system stability.															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	3											3			
CO2	3	3											3			
CO3	3	3				2	2						3	1		
CO4	3	2				2	2						3	2		
Avg.	3	2.75				2	2						3	1.5		

Subject: Power Electronics												Subject Code:21EE54				
Course Outcomes																
CO1	Understand & adopt types of power diodes with its switching characteristics & effects on RL circuits.															
CO2	Compare steady state, switching and gate characteristics of different power transistors.															
CO3	Explain different types of power thyristors, their gate characteristics and gate control requirements.															
CO4	Design various Converters and analyze their performance parameters															
CO-PO-PSO Mapping																
COs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	3	1									1		2		
CO2	3	3	1									1		2		
CO3	3	3	2									1		2		
Avg	3	3	3	1								1		2		

Subject: Power Electronics Lab												Subject Code: 21EEL55			
Course Outcomes															
CO1	To Study the Static characteristics and performance of semiconductor devices.														
CO2	Compare different methods of triggering SCR														
CO3	To Verify the performance of single phase controlled Full wave rectifier and AC voltage controller With R and RLE Loads.														
CO4	To analyze the speed Control of different motors and to verify the performance of single-phase full bridge inverter connected to a resistive load														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2						3	3				3	
CO2	3	2	2						3	3				3	
CO3	3	2	2						3	3				2	
CO4	3	2	2						3	3				2	
Avg.	3	2	2						3	3				2.5	

Subject: RESEARCH METHODOLOGY & INTELLECTUAL PROPERTY RIGHTS												Subject Code: 21RMI56			
Course Outcomes															
CO1	Understand basics, needs and importance of research														
CO2	Discuss the importance of engineering ethics, attribution, and citation in research														
CO3	Adopt and utilize the concepts of Intellectual Property Rights in engineering for patents, trademarks, and copyrights														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1					1		2			2		2		
CO2	1				1	1		3			2	1	2		
CO3	1				1	1		3			2	1	2		
Avg.	1				1	1		2.6			2	1	2		

Subject: Energy Audit project												Subject Code: 21EEP583			
Course Outcomes															
CO1	Analyze the data collected for the energy audit of a building or Industry or organization														
CO2	Perform Comparative analysis with and without energy audit.														
CO3	Examine the energy saving measures to be considered with economy considerations														
CO4	Communicate effectively work as a team member/leader to manage projects and costs in a diversified environment.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	2	1	2	2	2					2		
CO2	3	2	2	2	1	2	2	2					2		
CO3	3	2	2	2		2	2	2					2		
CO4								1	3	3	2		2		
Avg.	3	2	2	2	1	2	2	1.75	3	3	2		2		

Subject: Renewable Energy Projects										Subject Code: 21EEP584					
Course Outcomes															
CO1	Gain comprehensive knowledge about renewable energy projects														
CO2	Develop skills in planning and designing renewable energy projects, considering factors such as location, resource availability, and environmental impact.														
CO3	Consider the broader societal and environmental impacts of renewable energy projects, fostering a commitment to sustainable practices and community engagement.														
CO4	Communicate effectively work as a team member/leader to manage projects and costs in a diversified environment.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	2	1	2	2	2					2		
CO2	3	2	2	2	1	2	2	2					2		
CO3	3	2	2	2		2	2	2					2		
CO4								1	3	3	2		2		
Avg.	3	2	2	2	1	2	2	1.75	3	3	2		2		

Co-ordinator
Dr. J P Sridhar

HOD
Dr. Chandrashekar MJ