SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY, KODAKARA

Department of Electronics & Communication Engineering

Academic Year: 2022-23

S3 ECE (2021 –2025)

Course Code: MAT 201	Course Name: Partial differential Equations and Complex analysis	Credit:4	Faculty Name: Jemcy Antony
CO	STATEMENT		
CO1	Create and solve partial differential equations which are widely used in different engineering situations and modelling.		
CO2	Apply partial differential equations in the analysis of various physical phenomena.		
CO3	Analyse complex variables and conformality to transform functions from one domain to another.		
CO4	Demonstrate mathematical reasoning through the concepts of complex analysis.		

CO-PO mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3				2		2			2
CO2	3	3	3				2		2			2
CO3	2	3										
CO4	3	3										2

Justification

		Correlation	Justification
PO1	CO1	High	The knowledge of creation and solution of partial differential equations helps to solve complex engineering problems.
	CO2	High	Application of the partial differential equations eases many complex engineering problems in physical situations.
	CO3	Medium	The concept of complex variables and conformality to transform functions plays a vital role in engineering problems..
	CO4	High	The understanding of integral and residue theorems are highly useful in solving Engineering problems
PO2	CO1	High	Identification and analysis of many complex engineering problems can be done effectively with the knowledge of partial differential equations.
	CO2	High	The knowledge of wave and heat equations and their solutions eases the formulation and analysis of many physical phenomena that happens in and around our daily life.

	CO3	High	The application of conformality mapping plays an important role in the analysis of complex engineering problems.
	CO4	High	Many complex engineering problems can be analysed easily by integral theorems and residue theorems.
PO3	**CO1**	High	The knowledge of partial differential equations and their solution is essential for designing solutions for complex engineering problems and processes that meet the specific needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
	CO2	High	The concept of partial differential equations in the application level, especially one dimensional heat and wave equations is very important in designing solutions for complex engineering problems and processes that meet the specific needs with appropriate consideration for the public health and safety and environmental considerations.
PO7	**CO1**	Medium	The understanding of partial differential equations is very helpful in designing and modelling of solutions to environment related problems
	CO2	Medium	The concept of Partial differential equations and its applications in physical phenomena is applicable in designing models to societal and environmental contexts.
PO9	**CO1**	Medium	Group activities can be carried out in bringing out the solutions of different types of partial differential equations.
	CO2	Medium	Team work is essential in designing partial differential models in physical phenomena.
PO12	**CO1**	Medium	Moderately the student will become aware of the need for lifelong learning and the continued upgrading of technical knowledge of solution of partial differential equation and to apply that in different situations
	CO2	Medium	The student will become aware of the need for lifelong learning and the continued upgrading of technical knowledge of partial differential equations and its applications in daily life
	CO4	Medium	Moderately the student will become aware of the need for lifelong learning and the continued upgrading of technical knowledge as well as the theoretical knowledge of integral and residue theoerems.

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Department of Electronics & Communication Engineering

Academic Year: 2022-23

S3 ECE (2021 –2025)

Course Code	Course Name	Credit	Faculty Name

CO1	Find the key concepts involved in semiconductor and their characteristics .(with the help of quantum physics)
CO2	Analyze carrier flow and associated fields due to drift, diffusion, generation, and recombination.
CO3	Examine the processes in diodes and transistors(BJT AND FETS)
CO4	Apply mathematical methods for the analysis of solid state devices.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		3					3	3		2
CO2	3	3		2					3	3		2
CO3	3	3		2					3	3		2
CO4	3	3		2					3	3		3

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	2	
CO2	3	2	
CO3	3	2	
CO4	3	2	

Justification

		Mapping	Justification
CO1	PO1	3	Concepts of quantum physics, calculus are applied
	PO2	3	Analysis of semiconductor processes

	PO4	3	Key concepts form the Basis of complex investigations
	PO12	2	Fundamentals required for any analytical research in semiconductor physics/devices
	PSO1	2	Involves basic concepts used in design of any complex system
	PSO2	3	Involves basic processes that help in adapting to dynamic trends
CO2	PO1	3	Concepts of quantum physics, calculus are applied
	PO2	3	Analysis of processes involving drift, diffusion, generation, and recombination
	PO4	2	Processes involving drift, diffusion, generation, and recombination form the Basis of complex investigations in Semiconductor devices
	PO12	2	Fundamentals required for any analytical research in semiconductor physics/devices
	PSO1	3	Involves basic concepts used in design of any complex system
	PSO2	2	Involves basic processes that help in adapting to dynamic trends
CO3	PO1	3	Concepts of quantum physics, calculus are applied
	PO2	3	Analysis of processes in diodes and transistors
	PO4	2	Processes in diodes and transistors form the basis of complex investigations in Semiconductor devices
	PO12	2	Fundamentals required for any analytical research in semiconductor physics/devices
	PSO1	3	Involves basic concepts used in design of any complex system
	PSO2	2	Involves basic processes that help in adapting to dynamic trends
CO4	PO1	3	Concepts of quantum physics, calculus are applied
	PO2	3	Mathematical analysis of devices

	PO4	2	Form the basis of complex investigations in Semiconductor devices
	PO12	2	Fundamentals required for any analytical research in semiconductor physics/devices
	PSO1	3	Involves basic concepts used in design of any complex system
	PSO2	2	Involves basic circuits (a few) and processes that help in adapting to dynamic trends

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Department of Electronics & Communication Engineering

SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY,
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Academic Year: 2022-23

S3 ECE (2021 –2025)

EST 200	Design Engineering	2	Siji Joseph

CO1	To identify the significance of Engineering Design and apply it for real life problems.
CO2	To apply design thinking while learning and practicing engineering
CO3	To develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.
CO4	To analyze the prototype models and apprise various design aspects

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1			2		2			2		
CO2	3	2			3	2		3	3	2		2
CO3	3		3	3		2	2	3	2	3		3
CO4	2	3	3	3	2	2	2	3	3	3		3

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	2		
CO2		2	

CO3	3		
CO4	3		

Justification

		Mapping	Justification
CO1	PO1	2	In engineering design the basic sciences, mathematics, and engineering sciences are applied to optimally convert resources to meet a stated objective
	PO2	1	Using design engineering, students can Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions . Eg: To design and develop length adjustable mop
	PO5	2	CAD software can be used for designing
	PO7	2	The design stage is the most influential in determining how a product will affect the environment through its raw materials, manufacture, distribution, usage, maintenance and disposal.
	PO10	2	In engineering design, we communicate design results in several ways, including oral presentations, reports and prototypes and models.
	PSO1	2	Fundamental knowledge of electronics and science can be used to develop a product eg: bus stop with solar lamp
CO2	PO1	3	In engineering design the basic sciences, mathematics, and engineering sciences are applied and design thinking is critical to convert resources to meet a stated objective
	PO2	2	The basic sciences, mathematics, and engineering sciences are applied to analysis the problem

	PO5	3	softwares like CAD can be used for designing
	PO6	2	Design thinking systems make the resource-efficient and reduce the effect of consumer demand on the exploration
	PO8	3	Design thinking stage is used to determine how a product will affect the environment through its raw materials, manufacture, distribution, usage, maintenance and disposal.
	PO9	3	To make a Design Thinking project successful, we need T-shaped people.-Members of a Design Thinking team need to be open minded, curious, collaborative.
	PO10	2	In Design thinking , we communicate design results in several ways, including oral presentations, reports and prototypes and models.
	PO12	2	Design thinking life-long learning since the broadest context of technological change.
	PSO2	2	Design thinking used to follow the dynamic trends in Engineering.
CO3	PO1	3	Develop innovative, reliable, sustainable and economically viable designs by application of the knowledge of mathematics, science, engineering fundamentals, and engineering.
	PO3	3	Design solutions for innovative, reliable, sustainable and develop it.
	PO4	3	Conduct investigations for developing and design innovative, reliable, sustainable and economically viable designs
	PO6	2	Design and development of systems make the resource-efficient and reduce the effect of consumer demand on the exploration
	PO7	2	Design for environmental processing and manufacturing ensures that raw material Extraction, processing and manufacturing are done using materials and processes which are not dangerous to the environment or the employees working on said processes.
	PO8	3	Engineering design ethics concerns issues that arise during the design of technological products, processes, systems, and services. This includes issues such as safety, sustainability, user

			autonomy, and privacy.
	PO9	2	Design the innovative product by assigning different duties for each team or individuals eg:team for Design for use,team2 for Design for manufacturing etc
	PO10	3	In Design and development of innovative product , we communicate design results in several ways, including oral presentations, reports and prototypes and models
	PO12	3	Design and development of an innovative , reliable, sustainable product is life-long learning since the broadest context of technological change.
	PSO1	3	Apply the fundamental knowledge of Electronics and Communication for design or develop innovative, reliable, sustainable and economically viable designs.Eg:designing a wearable technology for a college student.
CO4	PO1	2	Apply the knowledge of mathematics, science, engineering fundamentals for designing prototypes- The prototype may be a mathematical model/a layout / a miniature form of working product
	PO2	3	Identify, formulate and analyse complex engineering problems with the help of mathematical model /a layout / a miniature form of working product
	PO3	3	Design solutions for complex engineering problems and design system components or processes and check whether the prototype meet the specified needs with appropriate consideration. If not redesign the product.
	PO4	3	Do experiments, analysis of the prototype and synthesis of the information to provide valid conclusions to check whether the prototype's functions /looks are the same as the actual product.
	PO5	2	Modern tools like AutoCAD ,Matlab, ORcad etc are used for developing prototypes.
	PO6	2	Design and development of prototypes helpful for making the resource-efficient and reducing the effect of consumer demand on the exploration,and to identify the legal and cultural issues.

	PO7	2	Using prototypes can understand the impact solutions in societal and environmental contexts.
	PO8	3	Prototype can be used to illustrate engineering design ethics concerns issues that arise during the design of technological products, processes, systems, and services and can be rectified by redesigning or trouble shooting.
	PO9	3	To make a Design successful, we need T-shaped people.- Members of a Design Thinking team need to be open minded, curious, collaborative and they should implement the ideas and check whether the prototypes / layouts designed by each team are working successfully.
	PO10	3	In Design and development of innovative product , we communicate design results in several ways, including oral presentations, reports and prototypes and models
	PO12	3	Life-long learning: the methods for developing prototypes, softwares , hardwares and softwares are changing day by day.
	PSO1	3	Apply the fundamental knowledge of Electronics and Communication Engineering to design and implement the prototype. Eg:for designing a wearable technology for a college student We need the basic knowledge of sensors and other electronic components

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Academic Year: 2022-23

S3 ECE (2021 –2025)

ECT 281	Electronic circuits	4	Siji Joseph

CO1	Students will be able to Realize simple circuits using diodes, resistors and capacitors
CO2	Students will be able to Design amplifier and oscillator circuits
CO3	Students will be able to Design Power supplies, D/A and A/D converters for various applications.
CO4	Students will be able to Design and analyze circuits using operational amplifiers.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3									2
CO2	3	3	3									2
CO3	3	3	3									2
CO4	3	3	3									2

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	3	
CO2	3	3	

CO3	3	3	
CO4	3	3	

Justification

		Mapping	Justification
CO1	PO1	3	Basic working and concept of integrator , differentiator - fundamentals of mathematics and electronics are applied . In waveshaping circuit fundamentals of electronics is applied
	PO2	3	Designing of waveshaping circuits with the help of some equations are carried out.
	PO3	3	Designing of integrator, differentiator etc are carried out
	PO12	2	Form fundamentals of any complex circuit dealt with throughout advanced topics/studies
	PSO1	3	Involves basic circuits used in design of any complex system
	PSO2	3	Involves basic circuits that help in adapting to dynamic trends

CO2	PO1	3	Basics of amplifier and oscillator circuit - fundamentals of science and electronics
	PO2	3	Analysis of power amplifiers and voltage regulators that facilitate complex problem' solutions
	PO3	3	Design of power amplifiers and voltage regulators

	PO12	2	life-long learning in the broadest context of technological change- interfacing and different types of memories
	PSO1	3	Involves basic oscillator, amplifier circuits used in design of any complex system
	PSO2	3	Involves basic oscillator, amplifier circuits that help in adapting to dynamic trends
CO3	PO1	3	basics of regulators, ADC and DAC - fundamentals of science and mathematics are applied
	PO2	3	Analyse complex engineering problems and develop the program
	PO3	3	Design of voltage regulators
	PO12	2	Form fundamentals of any complex circuit dealt with throughout advanced topics/studies
	PSO1	3	Involves basic voltage regulators , ADC & DAC circuits used in design of any complex system
	PSO3	3	Involves basic voltage regulators , ADC & DAC circuits that help in adapting to dynamic trends
CO4	PO1	3	adder/summing amplifier, subtractor, integrator, differentiator, Comparator, Instrumentation amplifier - apply the knowledge of science,mathematics and electronics
	PO2	3	Analysis of basic amplifier that facilitate complex problem' solutions
	PO3	3	Design of different circuits like adder/summing amplifier, subtractor, integrator, differentiator, Comparator, Instrumentation amplifier etc using op-amp.
	PO12	2	Form fundamentals of any complex circuit dealt with throughout advanced topics/studies
	PSO1	3	Involves op-amp circuits used in design of any complex system

	PSO2	3	Involves op-amp circuits that help in adapting to dynamic trends

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Academic Year: 2022 -23

S3 ECE (2020 –2024)

SCIENTIFIC COMPUTING LAB	2	VIDYAMOL K

CO1	Familiarize programming language for scientific computing applications
CO2	Analyze an array/matrix with matrix decomposition
CO 3	Implement numerical integration and differentiation and Solve ordinary differential equations for engineering applications
CO4	Execute Data analysis and perform its visualization in different modes

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			3				3	2		2
CO2	3	3			3				3	2		2
CO3	3	3			3				3	2		2
CO4	3	2			3				3	2		2

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1		2	2
CO2		2	2
CO3		2	2

CO4		2	2

Justification

		Mapping	Justification
CO1	PO1	3	Programming language familiarization requires basic engineering knowledge
	PO2	2	Programming language familiarization requires principles of mathematics and engineering sciences.
	PO5	3	Simulation through MALAB
	PO9	3	Experiments done in groups

	PO10	2	Lab experiments deals with comprehend and write effective reports.
	PO12	2	Simulation tools can be utilized in future studies
	PSO2	2	Simulation through MALAB
	PSO3	2	Simulation through MALAB
CO2	PO1	3	Programing matrix decomposition methods enquires basic engineering knowledge
	PO2	3	Programing matrix decomposition methods requires principles of mathematics and engineering sciences. – HIGH
	PO5	3	Simulation through MALAB

	PO9	3	Experiments done in groups
	PO10	2	Lab experiments deals with comprehend and write effective reports.
	PO12	2	Simulation tools can be utilized in future studies
	PSO2	2	Simulation through MALAB
	PSO3	2	Simulation through MALAB
CO3	PO1	3	Implementation of numerical integration and differentiation requires basic engineering knowledge
	PO2	3	Implementation of numerical integration and differentiation requires principles of mathematics and engineering sciences. – HIGH
	PO5	3	Simulation through MALAB
	PO9	3	Experiments done in groups
	PO10	2	Lab experiments deals with comprehend and write effective reports.
	PO12	2	Simulation tools can be utilized in future studies
	PSO2	2	Simulation through MALAB

	PSO3	2	Simulation through MALAB

CO4	PO1	3	Data analysis and perform its visualization requires basic engineering knowledge
	PO2	2	Data analysis and perform its visualization requires principles of mathematics and engineering sciences-medium
	PO5	3	Simulation through MALAB
	PO9	3	Experiments done in groups
	PO10	2	Lab experiments deals with comprehend and write effective reports.
	PO12	2	Simulation tools can be utilized in future studies
	PSO2	2	Simulation through MALAB
	PSO3	2	Simulation through MALAB

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Academic Year: 2022-23

S4 ECE (2021 –2025)

Course Code	Course Name	Credit	Faculty Name

CO1	Design and analyze fundamental wave-shaping circuits and BJT amplifier circuits
CO2	Analyze the frequency response of BJT and MOSFET amplifiers.
CO3	Apply the concept of feedback for the design of oscillators and amplifiers
CO4	Design and develop power amplifiers, switching circuits and voltage regulators

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2								2
CO1	3	2	3	2								2
CO2	3	2	3	2								2
CO4	3	2	3	2								2

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	3	
CO2	3	3	
CO3	3	3	
CO4	3	3	

Justification

		Mapping	Justification
CO1	PO1	3	Integration, Differentiation, Binomial series, Concepts of semiconductors and diodes are applied
	PO2	2	Analysis of basic amplifier that facilitate complex problem' solutions

	PO3	3	Design of filters and wave shaping circuits (clippers and clampers)
	PO4	2	Investigations of problems possible albeit complex ones are not dealt here.
	PO12	2	Form fundamentals of any complex circuit dealt with throughout advanced topics/studies
	PSO1	3	Involves basic circuits used in design of any complex system
	PSO2	3	Involves basic circuits that help in adapting to dynamic trends
CO2	PO1	3	Integration, Differentiation, Binomial series, Concepts of semiconductors and diodes are applied
	PO2	2	Analysis of basic amplifier(BJT, MOS) that facilitate complex problem' solutions
	PO3	3	Design of amplifiers (CE using BJT) and (CS using MOSFET)
	PO4	2	Investigations of problems possible albeit complex ones are not dealt here.
	PO12	2	Form fundamentals of any complex circuit dealt with throughout advanced topics/studies
	PSO1	3	Involves basic circuits used in design of any complex system
	PSO2	3	Involves basic circuits that help in adapting to dynamic trends
CO3	PO1	3	Integration, Differentiation, Binomial series, Concepts of semiconductors and diodes are applied
	PO2	2	Analysis of feedback topologies and oscillators that facilitate complex problem' solutions
	PO3	3	Design of oscillators
	PO4	2	Investigations of problems possible albeit complex ones are not dealt here.
	PO12	2	Form fundamentals of any complex circuit dealt with throughout advanced topics/studies
	PSO1	3	Involves basic circuits used in design of any complex system

	PSO2	3	Involves basic circuits that help in adapting to dynamic trends
CO4	PO1	3	Integration, Differentiation, Binomial expansion, Concepts of semiconductors and diodes are applied
	PO2	2	Analysis of power amplifiers and voltage regulators that facilitate complex problem' solutions
	PO3	3	Design of power amplifiers and voltage regulators
	PO4	2	Investigations of problems possible albeit complex ones are not dealt here.
	PO12	2	Form fundamentals of any complex circuit dealt with throughout advanced topics/studies
	PSO1	3	Involves basic circuits used in design of any complex system
	PSO2	3	Involves basic circuits that help in adapting to dynamic trends

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Department of Electronics & Communication Engineering

Academic Year: 2022-23

S4 ECE (2021 –2025)

ECT 204	Signals and Systems	4	Ambily Francis

CO1	Students are able to apply properties of signals and systems to classify them.
CO2	Students are able to apply convolution in linear time invariant systems.
CO3	Students are able to analyze the frequency domain characteristics of continuous and discrete time signals.
CO4	Students are able to apply sampling theorem to discretize continuous time signals.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3	3	3		3							
CO3	3	3	3									
CO4	3	3			3							

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3		
CO2	3		3
CO3	3		3
CO4	3	2	3

Justification

		Mapping	Justification
CO1	PO1	3	Properties of signals, classification of systems, basic signal operations – apply the knowledge of mathematics, science.
	PSO1	3	Properties of signals, classification of systems, basic signal

			operations – fundamental knowledge of EC, which can apply to design signal processing components.
CO2	PO1	3	Convolution of LTI systems - apply the knowledge of mathematics, science.
	PO2	3	Convolution of LTI systems – use convolution for the analysis of LTI systems.
	PO3	3	Convolution of LTI systems – use convolution for the design of CT, DT LTI systems.
	PO5	3	Convolution of LTI systems – Assignments to implement convolution using MATLAB, Python
	PSO1	3	Convolution of LTI systems - fundamental knowledge of EC, which can apply to design signal processing components.
	PSO3	3	Convolution of LTI systems – Implement the convolution using software tool to design the systems.
CO3	PO1	3	Transforms - apply the knowledge of mathematics, science.
	PO2	3	Transforms – Use transforms for the analysis of LTI systems.
	PO3	3	Transforms – Use transforms for the design of systems.
	PSO1	3	Transforms - fundamental knowledge of EC, which can apply to design signal processing components.
	PSO3	3	Transforms – Apply software tools to design the systems.
CO4	PO1	3	Sampling theorem - apply the knowledge of mathematics, science.
	PO2	3	Sampling theorem – analysis of systems.
	PO5	3	Sampling theorem – Implement the theorem and analysis spectrum using MATLAB.
	PSO1	3	Sampling theorem - fundamental knowledge of EC, which can apply to design signal processing components.
	PSO2	2	Sampling theorem – can follow dynamic trends in ECE.
	PSO3	3	Sampling theorem – Apply software tools to design the systems.

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S4 ECE (2021 –2025)

ECT 206	Computer Architecture and Micro controllers	4	Binet Rose Devassy

CO1	To analyse functional units, I/O, Memory management with respect to a typical computer architecture
CO2	To develop simple programs based on assembly language/ C programming
CO3	To Interface 8051 micro controller with peripheral devices using assembly language/ Embedded C
CO4	To analyze memory organization and architecture of advanced embedded system

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO1	3	3			3							3
CO2	3	3			3							3
CO4	3											3

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3		
CO2	3	2	3
CO3	3	2	3
CO4	3	3	

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Justification

		Mapping	Justification
CO1	PO1	3	Analyzing and understanding functional units of computer architecture helps to apply the engineering knowledge to find the solution for real life problems.
	PSO1	3	Analyzing the functions of each module of computer architecture helps to apply the fundamental knowledge to design and implement various types of electronic systems in embedded systems domain.
CO2	PO1	3	Developing simple programs requires the application of engineering knowledge, including principles of problem-solving, algorithm design, programming languages, testing and debugging.
	PO2	3	To find the solution for complex engineering problems, need to utilize effective and efficient programming skills.
	PO5	3	Modern tools like KEIL / Proteus software are used for programming that meet the requirements of the problem being solved.
	PO12	3	Developing programming skills helps in lifelong learning
	PSO1	3	Apply programming skills to design and develop solutions in embedded system domain
	PSO2	2	Developing programming skills helps to follow and adapt to the dynamic trends in the field of Embedded systems
	PSO3	3	To solve real life societal problems, programming skills need to develop using software tools.
CO3	PO1	3	Developing interfacing programs for peripherals require the application of engineering knowledge, including principles of problem-solving, algorithm design, programming languages, testing and debugging.
	PO2	3	To find the solution for complex engineering problems, need to utilize effective and efficient programming skills.
	PO5	3	Modern tools like KEIL / Proteus software are used for interfacing peripheral devices that meet the requirements of the problem being solved.
	PO12	3	Developing programming skills helps in lifelong learning

	PSO1	3	Apply programming skills to design and develop solutions in embedded system domain by connecting external sensors/devices
	PSO2	2	Developing programming skills helps to follow and adapt to the dynamic trends in the field of Embedded systems
	PSO3	3	To solve real life societal problems, programming skills need to develop using software tools.
CO4	PO1	3	Analyzing and understanding memory organization and architecture of advanced embedded system helps to apply the engineering knowledge to find the solution for current societal problems.
	PO12	3	Analyzing advanced embedded system architecture will help to improve lifelong learning in the field of embedded system.
	PSO1	3	Apply the concept of advanced embedded systems, to design and implement embedded based electronic systems.
	PSO2	3	Applying the concept of advanced embedded systems, helps to follow and adapt to the dynamic trends in the field of Embedded systems

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S4 ECE (2021 –2025)

ECL 204	Micro controller Lab	2	Binet Rose Devassy, Minu Johny

CO1	Write an Assembly language program/Embedded C program for performing data manipulation
CO2	Develop ALP/Embedded C Programs to interface microcontroller with peripherals
CO3	To analyse the concepts of microprocessor architecture and memory organization.
CO4	Apply in-depth knowledge of microcontrollers and peripherals to real- time applications.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3			3				3			3
CO2	3	3	2		3				3			3
CO3	3	3			3				3			3
CO4	3	3			3				3			3

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	2	3
CO2	3	2	3
CO3	3	2	3
CO4	3	2	3

Justification

SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY, KODAKARA

Department of Electronics & Communication Engineering

		Mapping	Justification
CO1	PO1	3	Assembly language program/Embedded C program for performing data manipulation-Engineering knowledge
	PO2	3	Assembly language program/Embedded C program for performing data manipulation-Related to problem analysis
	PO5	3	Assembly language program/Embedded C program for performing data manipulation-Usage of modern tools
	PO9	3	Assembly language program/Embedded C program for performing data manipulation-Develop Team work
	PO12	3	Assembly language program/Embedded C program for performing data manipulation-Initiate lifelong learning
	PSO1	3	Assembly language program/Embedded C program for performing data manipulation-Fundamental knowledge in Design and implementation
	PSO2	2	Assembly language program/Embedded C program for performing data manipulation-Adapt to trends in Electronics Engineering
	PSO3	3	Assembly language program/Embedded C program for performing data manipulation-Tools to find solutions to problems in society
CO2	PO1	3	Develop ALP/Embedded C Programs to interface microcontroller with peripherals-Engineering knowledge
	PO2	3	Develop ALP/Embedded C Programs to interface microcontroller with peripherals-Related to problem analysis
	PO3	2	Develop ALP/Embedded C Programs to interface microcontroller with peripherals-Design /development of solutions
	PO5	3	Develop ALP/Embedded C Programs to interface microcontroller with peripherals-Usage of modern tools
	PO9	3	Develop ALP/Embedded C Programs to interface microcontroller with peripherals-Develop Team work
	PO12	3	Develop ALP/Embedded C Programs to interface microcontroller with peripherals-Initiate lifelong learning
	PSO1	3	Develop ALP/Embedded C Programs to interface microcontroller with peripherals-Fundamental knowledge in Design and implementation

	PSO2	2	Develop ALP/Embedded C Programs to interface microcontroller with peripherals-Adapt to trends in Electronics Engineering
	PSO3	3	Develop ALP/Embedded C Programs to interface microcontroller with peripherals-Tools to find solutions to problems in society
CO3	PO1	3	Analyse the concepts of microprocessor architecture and memory organization--Engineering knowledge
	PO2	3	Analyse the concepts of microprocessor architecture and memory organization---Related to problem analysis
	PO5	3	Analyse the concepts of microprocessor architecture and memory organization-Usage of modern tools
	PO9	3	Analyse the concepts of microprocessor architecture and memory organization-Develop Team work
	PO12	3	Analyse the concepts of microprocessor architecture and memory organization-Initiate lifelong learning
	PSO1	3	Analyse the concepts of microprocessor architecture and memory organization--Fundamental knowledge in Design and implementation
	PSO2	2	Analyse the concepts of microprocessor architecture and memory organization--Adapt to trends in Electronics Engineering
	PSO3	3	Analyse the concepts of microprocessor architecture and memory organization-Tools to find solutions to problems in society
CO4	PO1	3	Apply in-depth knowledge of microcontrollers and peripherals to real- time applications-Engineering knowledge
	PO2	3	Apply in-depth knowledge of microcontrollers and peripherals to real- time applications -Related to problem analysis
	PO5	3	Apply in-depth knowledge of microcontrollers and peripherals to real- time applications -Usage of modern tools
	PO9	3	Apply in-depth knowledge of microcontrollers and peripherals to real- time applications-Develop Team work
	PO12	3	Apply in-depth knowledge of microcontrollers and peripherals to real- time applications-Initiate lifelong learning

	PSO1	3	Apply in-depth knowledge of microcontrollers and peripherals to real- time applications-Fundamental knowledge in Design and implementation
	PSO2	2	Apply in-depth knowledge of microcontrollers and peripherals to real- time applications-Adapt to trends in Electronics Engineering
	PSO3	3	Apply in-depth knowledge of microcontrollers and peripherals to real- time applications-Tools to find solutions to problems in society

SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY, KODAKARA
Department of Electronics & Communication Engineering

Academic Year: 2022-23

S4 ECE (2021 –2025)

HUT200	PROFESSIONAL ETHICS	02	MINU JOHNY

CO1	Understand the core values that shape the ethical behavior of a professional
CO2	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
CO3	Solve moral and ethical problems through exploration and assessment by established experiments.
CO4	Apply the knowledge of human values and social values to contemporary ethical values and global issues.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3	1	3	1			2
CO 2						2	1	3				3
CO3						3	1	3	1			2
CO4						2	1	3			1	3

	PSO1	PSO2	PSO3
CO1		2	
CO2		2	
CO3		1	
CO4		2	

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Department of Electronics & Communication Engineering

Justification

		Mapping	Justification
CO1	PO6	3	Understand the values that shape the ethical behaviour of a professional-Engineering and society
	PO7	1	Understand the values that shape the ethical behaviour of a professional-Environment and sustainability
	PO8	3	Understand the values that shape the ethical behaviour of a professional-Support Ethics
	PO9	1	Understand the values that shape the ethical behaviour of a professional-Develop individuality and Team work
	PO12	2	Understand the values that shape the ethical behaviour of a professional-Initiate Life long learning
	PSO2	2	Understand the values that shape the ethical behaviour of a professional-Follow dynamic trends in electronics engineering
CO2	PO6	2	Role and responsibility in technological development by keeping personal ethics and legal ethics-Engineering and society
	PO7	1	Role and responsibility in technological development by keeping personal ethics and legal ethics-Environment and sustainability
	PO8	3	Role and responsibility in technological development by keeping personal ethics and legal ethics-Support Ethics
	PO12	3	Role and responsibility in technological development by keeping personal ethics and legal ethics-Initiate Life long learning
	PSO2	2	Role and responsibility in technological development by keeping personal ethics and legal ethics-Follow dynamic trends in electronics engineering
CO3	PO6	3	Solve moral and ethical problems through exploration and assessment by established experiments-Engineering and society

	PO7	1	Solve moral and ethical problems through exploration and assessment by established experiments-Environment and sustainability
	PO8	3	Solve moral and ethical problems through exploration and assessment by established experiments-Support Ethics
	PO9	1	Solve moral and ethical problems through exploration and assessment by established experiments-Develop individuality and Team work
	PO12	2	Solve moral and ethical problems through exploration and assessment by established experiments-Initiate Life long learning
	PSO2	1	Solve moral and ethical problems through exploration and assessment by established experiments-Follow dynamic trends in electronics engineering
CO4	PO6	2	Human values and social values to contemporary ethical values and global issues-Engineering and society
	PO7	1	Human values and social values to contemporary ethical values and global issues-Environment and sustainability
	PO8	3	Human values and social values to contemporary ethical values and global issues-Support Ethics
	PO11	1	Human values and social values to contemporary ethical values and global issues-Project management
	PO12	3	Human values and social values to contemporary ethical values and global issues-Initiate Life long learning
	PSO2	2	Human values and social values to contemporary ethical values and global issues-Follow dynamic trends in electronics engineering

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Academic Year: 2022-23

S5 ECE (2021 –2025)

ECT 301	Linear Integrated Circuits	4	Binet Rose Devassy

CO1	Analyse Op Amp fundamentals and differential amplifier configurations
CO2	Design operational amplifier circuits for various applications
CO3	Analyse the working and applications of timer, VCO and PLL ICs
CO4	Analyse the working of Voltage regulator IC's and Data converters

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3									2
CO1	3	3	3									2
CO2	3	3	3									2
CO4	3	3	3									2

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	3	
CO2	3	3	
CO3	3	3	
CO4	3	3	

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Department of Electronics & Communication Engineering

Justification

		Mapping	Justification
CO1	PO1	3	Analyzing and understanding fundamentals and internal circuitry of op-amp helps to apply the engineering knowledge to find the solution for real life problems.
	PO2	3	To find the solution for complex engineering problems using opamp, understanding of op-amp fundamentals is needed.
	PO3	3	For the design and development of the solution for complex engineering problems using opamp, understanding of op-amp fundamentals is needed.
	PO12	1	Analyzing and understanding fundamentals and internal circuitry of op-amp helps to apply for Lifelong learning
	PSO1	3	Analyzing and understanding fundamentals of op-amp helps to design and develop solutions in the field of electronics.
	PSO2	3	Analyzing and understanding fundamentals of op-amp helps to follow and adapt to the dynamic trends in the field of Electronics.
CO2	PO1	3	Design of operational amplifier circuits for various applications requires to apply the engineering knowledge to find the solution for real life problems.
	PO2	3	Design of operational amplifier circuits for various applications is required to find the solution for complex engineering problems.
	PO3	3	Design and development of operational amplifier circuits is required to find the solution for complex engineering problems.
	PO12	1	Design and development of operational amplifier circuits helps to apply for Lifelong learning
	PSO1	3	Design and development of operational amplifier circuits is required to find the solution for complex engineering problems in electronics domain
	PSO2	3	Design and development of operational amplifier circuits helps to follow and adapt to the dynamic trends in the field of Electronics.
CO3	PO1	3	Analyse the working and applications of timer, VCO and PLL ICs requires applying the engineering knowledge to find

			the solution for real life problems.
	PO2	3	Analysing the working and applications of timer, VCO and PLL ICs is required to find the solution for complex engineering problems.
	PO3	3	Analysing the working and applications of timer, VCO and PLL ICs is required for the design and development of solutions for complex engineering problems.
	PO12	1	Analysing the working and applications of timer, VCO and PLL ICs helps to apply for Lifelong learning
	PSO1	3	Analysing the working and applications of timer, VCO and PLL ICs is required to find the solution for complex engineering problems in electronics domain
	PSO2	3	Analysing the working and applications of timer, VCO and PLL ICs helps to follow and adapt to the dynamic trends in the field of Electronics.
CO4	PO1	3	Analysing the working of Voltage regulator IC's and Data converters helps to apply the engineering knowledge to find the solution for real life problems.
	PO2	3	To find the solution for complex engineering problems using opamp, analysis of the working of Voltage regulator IC's and Data converters is needed.
	PO3	3	For the design and development of the solution for complex engineering problems using opamp, analysis of the working of Voltage regulator IC's and Data converters is needed.
	PO12	1	Analysing the working of Voltage regulator IC's and Data converters helps to apply for Lifelong learning
	PSO1	3	Analysing the working of Voltage regulator IC's and Data converters helps to design and develop solutions in the field of electronics.
	PSO2	3	Analysing the working of Voltage regulator IC's and Data converters helps to follow and adapt to the dynamic trends in the field of Electronics.

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S5 ECE (2020 –2024)

ECT305	ANALOG AND DIGITAL COMMUNICATION	4	VIDYAMOL K

CO1	Summarize the existent analog communication systems.
CO2	Apply the concepts of random processes to LTI systems
CO3	Demonstrate the impact of ISI and Equalizers in the communication channel
CO4	Apply waveform coding and digital modulation techniques in signal transmission

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2		2						2
CO2	3	3	3									
CO3	3	3	3	2		2						2
CO4	3	3	3	2		2						2

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3		
CO2	3		
CO3	3		
CO4	3		

Justification

		Mapping	Justification
CO1	PO1	3	Analog communication system modeling deals with usage of engineering fundamentals
	PO2	3	Analog communication system modeling deals with usage principles of mathematics and engineering fundamentals

	PO3	3	Analog communication system modeling deals with design and development of system components or process
	PO4	2	Leads to the development of analog communication modulation techniques
	PO6	2	Need and relevance of modulation techniques, concept of licensed and non-licensed spectrum
	PO12	2	Need and relevance of modulation techniques were always a add-on knowledge to the communication techniques they deals with real time applications
	PSO1	3	Analog communication system modeling deals with design and implement various types of electronic systems in communication
CO2	PO1	3	concepts of random processes to LTI systems deals with usage of engineering fundamentals
	PO2	3	concepts of random processes to LTI systems deals with usage principles of mathematics and engineering fundamentals
	PO3	3	concepts of random processes to LTI systems with design and development of system components or process
	PSO1		concepts of random processes to LTI systems deals with design and implement various types of electronic systems in communication
CO3	PO1	3	impact of ISI and Equalizers in the communication channel deals with usage of engineering fundamentals
	PO2	3	impact of ISI and Equalizers in the communication channel deals with usage principles of mathematics and engineering fundamentals
	PO3	3	impact of ISI and Equalizers in the communication channel deals with design and development of system components or process
	PO4	2	Leads to the development of techniques to analyze the impact of ISI and equalizers in communication channel
	PO6	2	Need and relevance of modulation techniques, concept of licensed and non-licensed spectrum, relevance to mitigate ISI and information security
	PO12	2	Need and relevance of secure communication channel is always a add-on knowledge to the communication techniques they deals with real time applications

	PSO1	3	impact of ISI and Equalizers in the communication channel modeling deals with design and implement various types of electronic systems in communication
CO4	PO1	3	waveform coding and digital modulation techniques deals with usage of engineering fundamentals
	PO2	3	waveform coding and digital modulation techniques deals with usage principles of mathematics and engineering fundamentals
	PO3	3	waveform coding and digital modulation techniques deals with design and development of system components or process
	PO4	2	Leads to the development of techniques for digital modulation schemes
	PO6	2	Need and relevance of digital modulation techniques, concept of licensed and non-licensed spectrum
	PO12	2	Need and relevance of secure communication channel is always a add-on knowledge to the communication techniques they deals with real time applications
	PSO1	3	waveform coding and digital modulation techniques modeling deals with design and implement various types of electronic systems in communication

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Academic Year: 2022-23

S5 ECE (2020 –2024)

ECT 307	Control Systems	4	Ambily Francis

CO1	Design mathematical models of control systems and thereby develop solutions.
CO2	Investigate stability constraints of a system and provide valid conclusions.
CO3	Design control system with suitable compensation techniques.
CO4	Analyze the discrete control system.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3									3
CO2	3	3										
CO3	3	3	3									2
CO4	3	3										2

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3		3
CO2	3		2
CO3	3	2	3
CO4	3	2	

Justification

		Mapping	Justification
CO1	PO1	3	mathematical models of control systems – apply the knowledge of mathematics
	PO2	3	mathematical models of control systems – problem analysis

	PO3	3	mathematical models of control systems – design
	PO12	3	mathematical models of control systems – scope for lifelong learning
	PSO1	3	mathematical models of control systems-fundamental knowledge of ECE
	PSO3	3	mathematical models of control systems-use of software tools
CO2	PO1	3	stability constraints of a system – apply knowledge of mathematics
	PO2	3	stability constraints of a system – problem analysis
	PSO1	3	stability constraints of a system- fundamental knowledge of ECE
	PSO3	2	stability constraints of a system- use of software tools
CO3	PO1	3	control system with suitable compensation techniques-apply the knowledge of mathematics
	PO2	3	control system with suitable compensation techniques– problem analysis
	PO3	3	control system with suitable compensation techniques– design
	PO12	2	control system with suitable compensation techniques– scope for lifelong learning
	PSO1	3	control system with suitable compensation techniques-fundamental knowledge of ECE
	PSO2	2	control system with suitable compensation techniques-follow dynamic trends in electronics
	PSO3	3	control system with suitable compensation techniques- use of software tools
CO4	PO1	3	discrete control system-apply the knowledge of mathematics
	PO2	3	discrete control system– problem analysis
	PO12	2	discrete control system– scope for lifelong learning

	PSO1	3	discrete control system- fundamental knowledge of ECE
	PSO2	2	discrete control system- use of software tools

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S5 ECE (2019-23)

EC341	Design project	2	Dr. Vishnu Rajan

CO1	Demonstrate sound technical knowledge in the domain of the selected project topic
CO2	Develop the skills of independent and collaborative learning and acquire the knowledge and awareness to carry out cost-effective and environmental friendly designs
CO3	Gain the expertise to use new tools for the design and development
CO4	Develop the ability to write good technical report and to make oral presentation of the work carried out
CO5	Develops ability to demonstrate a product developed

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**					**3**	**3**	**3**	**3**		**3**	**3**
CO1		**3**	**3**	**3**					**3**			**3**
CO2					**3**				**3**			**3**
CO4		**3**	**3**	**3**	**3**	**3**	**3**		**3**		**3**	**3**
CO5									**3**	**3**	**3**	**3**

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	3	3	3
CO3	3	3	3
CO4	2	2	2
CO5	2	2	2

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Justification

		Mapping	Justification
CO1	PO1	3	High correlation as applying engineering fundamentals is necessary to demonstrate sound technical knowledge in the project domain.
	PO6	3	High correlation, because without studying in depth regarding societal, health, safety, legal and cultural issues, development of a project itself is irrelevant
	PO7	3	A balance between technical knowledge and sustainability practice is necessary in building any mainstream project
	PO8	3	There is a high correlation between the program objective of applying ethical principles and committing to professional ethics and the course objective of demonstrating sound technical knowledge in the project domain, as both are crucial aspects of engineering practice.
	PO9	3	Sound technical skill set can be developed wonderfully when working as a team.
	PO11	3	There is a high correlation between the program objective of project management and finance and the course objective of demonstrating sound technical knowledge in the project domain, as both require different yet complementary skills for successful project completion.
	PO12	3	Even though life-long learning is a broader goal that extends beyond technical skills, doing a project by themselves will help students catch up with the concept of self learning and thus aid them in mastering the life long learning skills
	PSO1	3	High correlation as both require a deep understanding of electronic systems.
	PSO2	3	High correlation as both require adapting to changes and staying up-to-date with emerging technologies.
	PSO3	3	High correlation with the course objective of demonstrating sound technical knowledge in the project domain, as both require technical expertise to develop effective solutions.
CO2	PO2	3	High correlation as both require analytical skills and environmental awareness, but have distinct focuses.
	PO3	3	High correlation as both require technical skills and

			environmental awareness for successful implementation.
	PO4	3	High correlation as both require analytical skills and environmental awareness, but have distinct focuses.
	PO9	3	High correlation, as both require effective communication and cooperation for successful outcomes.
	PO12	3	High correlation, as both require a commitment to continuous learning and adapting to new technologies and practices.
	PSO1	3	High correlation as both require technical skills and environmental awareness for successful implementation in communication signal processing and embedded systems domain
	PSO2	3	High correlation as both require staying up-to-date with advancements and innovative solutions while considering the economic and environmental impact.
	PSO3	3	High correlation, as both require considering the impact on society and the environment while utilizing electronic hardware and software tools to develop innovative and effective solutions.

CO3	PO5	3	High correlation as the latter specifically aims to equip students with the skills to use the latest tools in the field for designing and developing electronic systems.
	PO9	3	The course objective of gaining expertise in using new tools for design and development aligns highly with the program objective of developing skills in individual and team work as both require proficiency in new tools.
	PO12	3	There is a strong correlation between the program objective of fostering life-long learning and the course objective of gaining expertise in using new tools, as both involve acquiring new knowledge and skills to adapt to changes in the industry.
	PSO1	3	Both objectives emphasize the importance of staying current with emerging technologies
	PSO2	3	The course objective of gaining expertise in using new tools for design and development aligns well with the program objective of following and adapting to dynamic trends in Electronics Engineering, as both require staying up-to-date with the latest technologies and tools to remain competitive in the field
	PSO3	3	Both objectives emphasize the importance of leveraging

			technology to find innovative solutions to real-world challenges.
CO4	PO2	3	The course objective of developing the ability to write good technical reports and make oral presentations aligns highly with the program objective of problem analysis, as effective communication skills are critical for presenting problem analysis findings in a clear and concise manner.
	PO3	3	High correlation as effective communication skills are essential for presenting the design and development of solutions to stakeholders.
	PO4	3	High Correlation, as effective communication is essential for conveying the results of complex investigations in a clear and concise manner.
	PO5	3	High Correlation, as modern tools are essential in creation of quality reports
	PO6	3	High Correlation, as effective communication skills are critical for presenting the engineer's work and its impact on society to a wider audience.
	PO7	3	High Correlation, as effective communication skills are essential for presenting the findings and impacts of engineering work on the environment and society in a clear and concise manner.
	PO9	3	High Correlation, as effective communication is essential for presenting individual and team contributions to a project in a clear and concise manner.
	PO11	3	High Correlation, as effective communication skills are essential for presenting project management and financial information to stakeholders in a clear and concise manner.
	PO12	3	High Correlation, as effective communication skills are critical for presenting the results of ongoing learning and professional development in a clear and concise manner.
	PSO1	3	The program objective of applying fundamental knowledge to design and implement electronic systems highly aligns with the course objective of developing the ability to write good technical reports and make oral presentations, as designing and implementing electronic systems requires clear and effective communication of technical information
	PSO2	3	High Correlation, as staying up-to-date with industry advancements and effectively communicating technical

			information is essential for success in the field.
	PSO3	3	High Correlation, as effective communication skills are necessary for presenting technical solutions and their impact on society in a clear and concise manner.
CO5	PO9	3	The course objective of developing the ability to demonstrate a product aligns highly with the program objective of developing skills in individual and team work, as effective product demonstrations often require collaboration and effective communication among team members.
	PO10	3	The course objective of developing the ability to demonstrate a product aligns well with the program objective of developing communication skills, as effective product demonstrations often require clear and concise communication to convey the features and benefits of the product to potential users or customers.
	PO11	3	High correlation, as demonstrating a product may require project management skills and an understanding of financial considerations such as budgeting and cost analysis.
	PO12	3	High correlation, as demonstrating a product may require continuous learning and adaptation to new technologies and market trends.
	PSO1	3	High correlation, as demonstrating a product often involves showcasing the capabilities of electronic systems in a real-world context.
	PSO2	3	The course objective of developing the ability to demonstrate a product aligns well with the program objective of following and adapting to dynamic trends in Electronics Engineering, as demonstrating a product may require incorporating new technologies and trends to showcase innovative and relevant features.
	PSO3	3	The program objective of applying electronic tools to solve societal problems aligns moderately with the course objective of developing the ability to demonstrate a product, as demonstrating a product may require showcasing how electronic tools can solve real-world problems in society.

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S6 ECE (2020 –2024)

ECT 302	Electromagnetics	4	Naiji Joseph

CO1	Student will be able to summarize the basic mathematical concepts related to electromagnetic vector fields
CO2	Student will be able to analyze Maxwell's equation in different forms and apply them to diverse engineering problems
CO3	Student will be able to analyze electromagnetic wave propagation and wave polarization
CO4	Student will be able to analyze the characteristics of transmission lines and solve the transmission line problems using Smith chart
CO5	Student will be able to analyze and evaluate the propagation of EM waves in Waveguides

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										2
CO2	3	3										2
CO3	3	3	2									2
CO4	3	3	2									2
CO5	3	3	2									2

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CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1			
CO2			
CO3	3		
CO4	3		
CO5	3		

Justification

COs	**POs**	Mapping	Justification
CO1	PO1	3	Apply the knowledge of mathematics and science- vector algebra, vector calculus, basic scientific laws related to electromagnetic vector fields
	PO2	3	Problem analysis using basic principles of mathematics and science- electric field and magnetic field vector problems are analyzed based on the fundamental laws of electrostatics and magnetostatics
	PO12	2	Life-long learning- mathematical concepts related to electrostatics and magnetostatics is a life long learning process according to the technology change
CO2	PO1	3	Apply the knowledge of mathematics and science- Maxwell's equations which are the fundamental laws in electromagnetism are derived from basic scientific laws and mathematics fundamentals
	PO2	3	Problem analysis using basic principles of mathematics and science- problems related to electric field and magnetic field conditions in a boundary, energy contained in electric and magnetic field etc are formulated from the Maxwell's equations
	PO12	2	Life-long learning- Maxwell's equations can be analyzed and applied to diverse engineering problems according to

			the technology change
CO3	PO1	3	Apply the knowledge of mathematics and science- analyzing and deriving parameters for a traveling wave through different media using mathematical concepts and basic scientific principles
	PO2	3	Problem analysis using basic principles of mathematics and engineering science- the effects in electromagnetic waves when propagating through different media like attenuation, phase shift, polarization can be analyzed using fundamentals of engineering science
	PO3	2	Design/development of solutions- some parameters can be adjusted for the better transmission of electromagnetic waves through any media without any attenuation
	PO12	2	Life-long learning- basics of electromagnetic radiation in different media is a learning process and can be applied according to the advancement in communication technology
	PSO1	3	Apply the fundamental knowledge of Electronics and Communication Engineering to implement various types of electronic systems in communication- electromagnetic wave propagation in a communication system
CO4	PO1	3	Apply the knowledge of mathematics and science- deriving transmission line parameters and characteristics
	PO2	3	Problem analysis using basic principles of mathematics and science- transmission line problems with Smith chart
	PO3	2	Design/development of solutions: transmission line s can be designed in terms of its characteristic impedance, input impedance and parameters
	PO12	2	Life-long learning-analysis of electromagnetic wave propagation through specialized cables can be applied according to the advancement in communication technology
	PSO1	3	Apply the fundamental knowledge of Electronics and Communication Engineering to implement various types of electronic systems in communication- electromagnetic radiation of signals through a transmission line(specialized cable) in a communication system
CO5	PO1	3	Apply the knowledge of mathematics and science- analyze the electromagnetic wave propagation through a special type of transmission lines, wave guides

	PO2	3	Problem analysis using basic principles of mathematics and science-waveguide problems can be analyzed in terms of propagation and waveguide parameters
	PO3	2	Design/development of solutions: design of waveguide structure can be done in terms of its dimensional features for a specific set of requirements
	PO12	2	Life-long learning-analysis of electromagnetic wave propagation through guided structures can be applied according to the advancement in communication technology
	PSO1	3	Apply the fundamental knowledge of Electronics and Communication Engineering to implement various types of electronic systems in communication- electromagnetic radiation of signals through waveguide in a communication system

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S6 ECE (2020 –2024)

Course Code	Course Name	Credit	Faculty Name

CO1	Study structure and analyse various design methodologies in ASIC and FPGA design.
CO2	Design VLSI Logic circuits with various MOSFET logic families.
CO3	Compare different types of memory elements. Design and analyse data path elements such as Adders and multipliers.
CO4	Explain MOSFET fabrication techniques and layout design rules.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3									2
CO2	3	2	3									2
CO3	3	2	3									2
CO4	3		3									3

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	2	3	2
CO2	3	2	
CO3	3	2	
CO4	3	2	2

Justification

		Mapping	Justification
CO1	PO1	3	Concepts of semiconductors, diodes and flip flops are applied
	PO3	3	Design flow of any system using FPGA/ASIC

	PO12	2	Complex circuit prototypes in the industry are developed using FPGA
	PSO1	2	Design processes in development of complex systems are discussed (only)
	PSO2	3	Complex circuit prototypes in the industry are developed using FPGA – hence helps in adapting to dynamic trends
	PSO3	2	Involves the use of many hardware and software tools albeit it is not required in the syllabus as such.
CO2	PO1	3	Concepts of Boolean logic and transistors are applied
	PO2	2	Analysis (Static and Transient) of CMOS inverter
	PO3	3	Design of digital circuits using different logics like Static CMOS, dynamic, PTL, Transmission gate .
	PO12	2	Any electronic circuit involves the inverter and this is dealt with in detail.
	PSO1	3	Involves basic circuits used in design of any complex system
	PSO2	2	Involves basic circuits that help in adapting to dynamic trends
CO3	PO1	3	Concepts of boolean algebra, digital gates, semiconductors and diodes are applied
	PO2	2	Analysis of adders and multipliers which are the building blocks of any digital circuit. Hence facilitates the development of complex problems.
	PO3	3	Design of adder and multiplier critical paths and delay.
	PO12	2	Form the building block of any complex digital circuit dealt with throughout in advanced topics/studies
	PSO1	3	Involves basic circuits (adder, subtractor, memory) used in design of any complex system
	PSO2	2	Involves basic circuits(adder, subtractor, memory) that help in adapting to dynamic trends
	PO1	3	Integration, Differentiation, Concepts of semiconductors are applied

CO4	PO3	2	Design of Inverter,NAND,NOR gates layouts alone
	PO12	2	Form fundamentals of any complex layout dealt with throughout advanced topics/studies
	PSO1	3	Involves basic circuits used in design of any complex system
	PSO2	2	Involves basic circuits (a few) and processes that help in adapting to dynamic trends
	PSO3	2	Use of software tools for layout albeit it is not required in the syllabus as such.

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Academic Year: 2022-23

S6 ECE (2020 –2024)

ECT 306	Information Theory and Coding	4	CHINCHU JOSE

CO1	Apply the basics of information theory on source coding techniques.
CO2	Apply the knowledge of Shannon's Fano coding theorem and channel coding theorem for designing an efficient and error free communication link.
CO3	Analyze various coding schemes for error detection and correction
CO4	Design an optimum decoder for various coding schemes.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2									
CO1	3	3										
CO2	3	3	2									3
CO4	3		3									2

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3		2
CO2	3		2
CO3	3	3	3
CO4	3	2	2

Justification

		Mapping	Justification
CO1	PO1	3	Basics of information theory on source coding techniques apply the knowledge of mathematics

	PO3	2	Basics of information theory on source coding techniques design
	PSO1	3	Basics of information theory on source coding techniques fundamental knowledge in communication
	PSO3	2	Basics of information theory on source coding techniques can use software tools
CO2	PO1	3	Shannon's source coding theorem and channel coding theorem apply the knowledge of mathematics
	PO2	3	Shannon's source coding theorem and channel coding theorem - problem analysis
	PSO1	3	Shannon's source coding theorem and channel coding theorem fundamental knowledge in communication
	PSO3	2	Shannon's source coding theorem and channel coding theorem can use software tools
CO3	PO1	3	Coding schemes for error detection and correction-apply the knowledge of mathematics
	PO2	3	Coding schemes for error detection and correction-problem analysis
	PO3	2	Coding schemes for error detection and correction-design
	PO12	3	Coding schemes for error detection and correction-scope for future learning
	PSO1	3	Coding schemes for error detection and correction-fundamental knowledge in communication
	PSO2	3	Coding schemes for error detection and correction-can follow dynamic trends
	PSO3	3	Coding schemes for error detection and correction-can use software tools
CO4	PO3	3	Optimum decoder for various coding schemes-design
	PO12	2	Optimum decoder for various coding schemes-scope for future learning
	PSO1	3	Optimum decoder for various coding schemes-fundamental knowledge in communication

	PSO2	2	Optimum decoder for various coding schemes-can follow dynamic trends

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Academic Year: 2022-23

S6 ECE (2020 –2024)

ECT 342	EMBEDDED SYSTEMS	3	Siji Joseph

CO1	Students will be able to understand and gain the basic idea about the embedded system
CO2	Students will be able to understand the peripheral devices and their interfacing with the processor
CO3	Students will be able to gain architectural level knowledge about the system and hence to program an embedded system.
CO4	Students will be able to Apply the knowledge for solving the real life problems with the help of an embedded system.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2					2				2
CO2	3	3	3									2
CO3	3	3	3		3			2				2
CO4	3	3	3		3			2	3			2

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3		
CO2	3	3	
CO3	3		3
CO4	3	2	3

Justification

		Mapping	Justification
CO1	PO1	3	Fundamentals of embedded systems and System Design Process – apply the science and engineering fundamentals.
	PO2	3	Identify, formulate,and analyse complex engineering problems reaching substantiated conclusions using engineering sciences.
	PO3	2	The Embedded System Design Process
	PO8	2	Accelerate the fundamental awareness and understand characteristics and quality attributes of an embedded system
	PO12	2	Life-long learning in the broadest context of technological change- Requirements, Designing Hardware and Software Components are changing day by day.
	PSO1	3	Fundamentals of embedded systems and System Design

CO2	PO1	3	Fundamentals of embedded systems and System Design Process-understand the peripheral devices and their interfacing with the processor
	PO2	3	Knowledge of Serial Communication Standards and Devices
	PO3	3	Design solutions for complex engineering problems and design system components or processes - Serial & parallel Communication Standards and Devices
	PO12	2	life-long learning in the broadest context of technological change- interfacing and different types of memories
	PSO1	3	fundamental knowledge of interfacing and peripheral device applied to design and implement Embedded system
	PSO2	3	adapt to the dynamic trends in interfacing, peripherals and memories
CO3	PO1	3	Gain architectural level knowledge and programming fundamentals

	PO2	3	Analyse complex engineering problems and develop the program
	PO3	3	Design/development of solutions: -ARM assembly language program
	PO5	3	simulation tools like Keil, Eclipse can be used for programming
	PO8	2	The ethical guidelines that developers are expected to follow and apply when writing programming code
	PO12	2	Three stage pipeline ARM , Five stage pipeline
	PSO1	3	Architectural knowledge and programming fundamentals
	PSO3	3	Application of simulation tool like Keil and Eclipse
CO4	PO1	3	Operating system basics - apply the knowledge of science.
	PO2	3	Real time operating systems
	PO3	3	task scheduling, multiprocessing and multi-tasking–processes that meet the specified needs with appropriate consideration
	PO5	3	Real time operating system-Linux
	PO8	2	Choosing an RTOS
	PO9	3	Development of real time os multiprocessing and multi-tasking
	PO12	2	Operating systems are dealt with throughout in advanced topics.
	PSO1	3	Involve Operating system basics
	PSO2	2	Adapt to the dynamic trends in the operating systems.
	PSO3	3	Terminal is used for enter commands in operating system

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Academic Year: 2022-23

S6 ECE (2019-23)

ECD334	Mini project	2	Dr. Vishnu Rajan

CO1	Demonstrate sound technical knowledge in the domain of the selected project topic
CO2	Develop the skills of independent and collaborative learning and acquire the knowledge and awareness to carry out cost-effective and environmental friendly designs
CO3	Gain the expertise to use new tools for the design and development
CO4	Develop the ability to write good technical report and to make oral presentation of the work carried out
CO5	Develops ability to demonstrate a product developed

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**					**3**	**3**	**3**	**3**		**3**	**3**
CO1		**3**	**3**	**3**					**3**			**3**
CO2					**3**				**3**			**3**
CO4		**3**	**3**	**3**	**3**	**3**	**3**		**3**		**3**	**3**
CO5									**3**	**3**	**3**	**3**

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	3	3	3
CO3	3	3	3
CO4	2	2	2
CO5	2	2	2

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Justification

		Mapping	Justification
CO1	PO1	3	High correlation as applying engineering fundamentals is necessary to demonstrate sound technical knowledge in the project domain.
	PO6	3	High correlation, because without studying in depth regarding societal, health, safety, legal and cultural issues, development of a project itself is irrelevant
	PO7	3	A balance between technical knowledge and sustainability practice is necessary in building any mainstream project
	PO8	3	There is a high correlation between the program objective of applying ethical principles and committing to professional ethics and the course objective of demonstrating sound technical knowledge in the project domain, as both are crucial aspects of engineering practice.
	PO9	3	Sound technical skill set can be developed wonderfully when working as a team.
	PO11	3	There is a high correlation between the program objective of project management and finance and the course objective of demonstrating sound technical knowledge in the project domain, as both require different yet complementary skills for successful project completion.
	PO12	3	Even though life-long learning is a broader goal that extends beyond technical skills, doing a project by themselves will help students catch up with the concept of self learning and thus aid them in mastering the life long learning skills
	PSO1	3	High correlation as both require a deep understanding of electronic systems.
	PSO2	3	High correlation as both require adapting to changes and staying up-to-date with emerging technologies.
	PSO3	3	High correlation with the course objective of demonstrating sound technical knowledge in the project domain, as both require technical expertise to develop effective solutions.
CO2	PO2	3	High correlation as both require analytical skills and environmental awareness, but have distinct focuses.
	PO3	3	High correlation as both require technical skills and

			environmental awareness for successful implementation.
	PO4	3	High correlation as both require analytical skills and environmental awareness, but have distinct focuses.
	PO9	3	High correlation, as both require effective communication and cooperation for successful outcomes.
	PO12	3	High correlation, as both require a commitment to continuous learning and adapting to new technologies and practices.
	PSO1	3	High correlation as both require technical skills and environmental awareness for successful implementation in communication signal processing and embedded systems domain
	PSO2	3	High correlation as both require staying up-to-date with advancements and innovative solutions while considering the economic and environmental impact.
	PSO3	3	High correlation, as both require considering the impact on society and the environment while utilizing electronic hardware and software tools to develop innovative and effective solutions.

CO3	PO5	3	High correlation as the latter specifically aims to equip students with the skills to use the latest tools in the field for designing and developing electronic systems.
	PO9	3	The course objective of gaining expertise in using new tools for design and development aligns highly with the program objective of developing skills in individual and team work as both require proficiency in new tools.
	PO12	3	There is a strong correlation between the program objective of fostering life-long learning and the course objective of gaining expertise in using new tools, as both involve acquiring new knowledge and skills to adapt to changes in the industry.
	PSO1	3	Both objectives emphasize the importance of staying current with emerging technologies
	PSO2	3	The course objective of gaining expertise in using new tools for design and development aligns well with the program objective of following and adapting to dynamic trends in Electronics Engineering, as both require staying up-to-date with the latest technologies and tools to remain competitive in the field
	PSO3	3	Both objectives emphasize the importance of leveraging

			technology to find innovative solutions to real-world challenges.
CO4	PO2	3	The course objective of developing the ability to write good technical reports and make oral presentations aligns highly with the program objective of problem analysis, as effective communication skills are critical for presenting problem analysis findings in a clear and concise manner.
	PO3	3	High correlation as effective communication skills are essential for presenting the design and development of solutions to stakeholders.
	PO4	3	High Correlation, as effective communication is essential for conveying the results of complex investigations in a clear and concise manner.
	PO5	3	High Correlation, as modern tools are essential in creation of quality reports
	PO6	3	High Correlation, as effective communication skills are critical for presenting the engineer's work and its impact on society to a wider audience.
	PO7	3	High Correlation, as effective communication skills are essential for presenting the findings and impacts of engineering work on the environment and society in a clear and concise manner.
	PO9	3	High Correlation, as effective communication is essential for presenting individual and team contributions to a project in a clear and concise manner.
	PO11	3	High Correlation, as effective communication skills are essential for presenting project management and financial information to stakeholders in a clear and concise manner.
	PO12	3	High Correlation, as effective communication skills are critical for presenting the results of ongoing learning and professional development in a clear and concise manner.
	PSO1	3	The program objective of applying fundamental knowledge to design and implement electronic systems highly aligns with the course objective of developing the ability to write good technical reports and make oral presentations, as designing and implementing electronic systems requires clear and effective communication of technical information
	PSO2	3	High Correlation, as staying up-to-date with industry advancements and effectively communicating technical

			information is essential for success in the field.
	PSO3	3	High Correlation, as effective communication skills are necessary for presenting technical solutions and their impact on society in a clear and concise manner.
CO5	PO9	3	The course objective of developing the ability to demonstrate a product aligns highly with the program objective of developing skills in individual and team work, as effective product demonstrations often require collaboration and effective communication among team members.
	PO10	3	The course objective of developing the ability to demonstrate a product aligns well with the program objective of developing communication skills, as effective product demonstrations often require clear and concise communication to convey the features and benefits of the product to potential users or customers.
	PO11	3	High correlation, as demonstrating a product may require project management skills and an understanding of financial considerations such as budgeting and cost analysis.
	PO12	3	High correlation, as demonstrating a product may require continuous learning and adaptation to new technologies and market trends.
	PSO1	3	High correlation, as demonstrating a product often involves showcasing the capabilities of electronic systems in a real-world context.
	PSO2	3	The course objective of developing the ability to demonstrate a product aligns well with the program objective of following and adapting to dynamic trends in Electronics Engineering, as demonstrating a product may require incorporating new technologies and trends to showcase innovative and relevant features.
	PSO3	3	The program objective of applying electronic tools to solve societal problems aligns moderately with the course objective of developing the ability to demonstrate a product, as demonstrating a product may require showcasing how electronic tools can solve real-world problems in society.

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Academic Year: 2022-23

S7 ECE (2019 –2023)

ECT 401	Microwaves And Antenna	4	CHINCHU JOSE

CO1	Analyze and simulate the concept of antennas and its parameters..
CO2	Design of various broad band antennas, arrays and its radiation patterns
CO3	Illustrate the principle of operation of cavity resonators and various microwave sources.
CO4	Analyze microwave hybrid circuits and microwave semiconductor devices.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	2			3	3		3
CO1	3	3	3	2	3	2			3	3		3
CO2	3	3										
CO4	3											

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	3	3
CO2			
CO3		2	
CO4		2	

Justification

		Mapping	Justification
CO1	PO1	3	Apply the knowledge of mathematics and engineering fundamentals to solve and derive the antenna parameters

	PO2	3	Analyze problems using first principles of mathematics and engineering sciences.
	PO3	3	Solutions for radiation hazards is given as an assignment.
	PO4	2	Design of experiments, analysis of data, is done as simulation assignment.
	PO5	3	Simulation experiment using HFSS is done.
	PO6	2	Apply reasoning by the contextual knowledge on radiation hazards to assess societal, health, safety.
	PO9	3	Individual assignments was given to simulate the antenna parameters.
	PO10	3	Report on assignments was submitted in written format.
	PO12	3	Recognize the need for life-long learning in the broadest context of technological change.(HFSS software)
	PSO1	3	Apply the fundamental knowledge of Electronics and Communication Engineering to design electronic systems in communication.
	PSO2	3	Familiarization of HFSS software for antenna simulation was used.
	PSO3	3	Apply electronic software tool to find the solutions for problems to the society.
CO2	PO1	3	Apply the knowledge of mathematics and engineering fundamentals to study and design various antennas.
	PO2	3	Analyze problems using first principles of mathematics and engineering sciences.
	PO3	3	Solutions for radiation hazards is given as an assignment.
	PO4	2	Design of experiments, analysis of data, is done as simulation assignment.

	PO5	3	Simulation experiment using HFSS is done.
	PO6	2	Apply reasoning by the contextual knowledge on radiation hazards to assess societal, health, safety.
	PO9	3	Individual assignments was given to simulate the antenna parameters.
	PO10	3	Report on assignments was submitted in written format.
	PO12	3	Recognize the need for life-long learning in the broadest context of technological change.(HFSS software)
CO3	PO1	3	Apply the knowledge of mathematics and engineering fundamentals to study various active and passive microwave devices.
	PO2	3	Analyze problems .using first principles of mathematics and engineering sciences
	PSO2	2	Students can follow the working of microwave devices in day to day life like ovens.
CO4	PO1	3	Apply the knowledge of mathematics and engineering fundamentals to study various waveguide tees,S parameters and microwave SSds .
	PSO2	2	Students can follow the working of microwave ssds .

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Academic Year: 2022-23

S7 ECE (2017-21)

ECT413	Optical Communication	3	Dr. Vishnu Rajan

CO1	Understand the working and classification of optic fibers in terms of propagation modes
CO2	Solve problems of transmission characteristics and losses in optical fiber
CO3	Explain the constructional features and characteristics of optical sources and detectors
CO4	Describe the operations of optical amplifiers
CO5	Understand the concepts of Lifi, WDM, FSO

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										
CO1		3	2	2				2				2
CO2		3		2								
CO4		3		2								
CO5	3	3										

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1			
CO2			
CO3			
CO4		2	2
CO5		2	2

Justification

SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY, KODAKARA
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		Mapping	Justification
CO1	PO1	3	This is because the course directly addresses the program objective by providing in-depth knowledge and understanding of the working and classification of optic fibers, which is an important topic in the field of engineering
	PO2	3	Analyze optic fiber systems by understanding the different propagation modes and their classification to identify and troubleshoot issues
CO2	PO2	3	The ability to analyze and identify the causes of signal degradation and loss is crucial in designing and optimizing optical fiber systems.
	PO3	2	course objective directly relates to the program objective in that designing and developing solutions for transmission characteristics and losses in optical fiber is a key aspect of the field of optical communications engineering
	PO4	2	Conducting investigations to identify and troubleshoot complex problems related to transmission characteristics and losses in optical fiber requires in-depth analysis and technical expertise, resulting in a medium correlation between the program objective and course objective.
	PO8	2	While solving problems, engineers must not forget the ethical part of it.
	PO12	2	Life-long learning and solving problems of transmission characteristics and losses in optical fiber are correlated, as keeping up with the latest research is crucial for finding solutions and implementing them effectively.
CO3	PO2	3	To analyze the constructional features and characteristics of optical sources and detectors, a thorough understanding of their physical principles and working mechanisms is necessary. This involves detailed problem analysis to identify potential issues and optimize the design
	PO4	2	Conducting investigations involves a deep understanding of the components involved in the system, including optical sources and detectors, which requires a detailed explanation of their constructional features and characteristics.
CO4	PO2	3	In-depth understanding of optical amplifiers requires a thorough analysis of their operation, which necessitates problem-solving skills and a solid grasp of the subject matter.

	PO4	2	Conducting investigations of complex problems in optical amplifier operations involves advanced knowledge and analysis of system performance, design optimization, and noise reduction techniques.
	PSO2	2	Understanding optical amplifiers is essential in modern optical communication systems.
	PSO3	2	Optical amplifiers are important in the field of communication and indirectly they find usefulness in societal innovations
CO5	PO1	3	LiFi (Light Fidelity), WDM (Wavelength Division Multiplexing), and FSO (Free Space Optics) are concepts related to optical communication, which an Electronics Engineer should know for designing and analyzing communication systems.
	PO2	3	Understanding the concepts of Lifi, WDM, and FSO requires a deep analysis of their working principles, characteristics, and applications, which involves problem analysis skills.
	PSO2		These cutting-edge technologies are currently trending in the field of electronics, and staying up-to-date with them is crucial for engineers to adapt and innovate.
	PSO3		These concepts are relevant to modern communication systems, which can be utilized to address societal issues, but further context is needed

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Academic Year: 2021-22

S7 ECE (2021 –2022)

MCN 401	INDUSTRIAL SAFETY	3	Dr.Silpa P A

CO1	Describe the theories of accident causation and preventive measures of industrial accidents
CO2	Understand about the personal protection in work environment and select a protective equipment according to the requirement
CO3	Explain safety issues in various construction operations
CO4	Identify and analyse safety hazards and recommend preventive measures

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3			3		2				3
CO1	3	3	2			3		2				3
CO2	2	3				3						3
CO4	3	3	3			3		2				3

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1			
CO2			
CO3			
CO4			2

Justification

SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY, KODAKARA
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		Mapping	Justification
CO1	PO1	3	Apply knowledge of v arious domain
	PO2	3	Analyse causes of accidents,types etc
	PO3	2	Solutions such as safety policy,safety audit etc
	PO6	3	Safety orgaisation,role of management
	PO8	2	Ethics of safety
	PO12	2	Safety policies of different organisations
CO2	PO1	3	Apply knowledge of various domain such as chemistry,physics etc
	PO2	2	Analyse different hazards
	PO3	2	Design of different PPE
	PO6	3	Monitoring different safety issues
	PO8	2	Ethics in designing varius ppe
	PO12	3	Life long learning of all safety issues
CO3	PO1	2	Apply knowlede of basic civil
	PO2	3	Analysis of different construction hazards
	PO6	2	Societal health ergonomic hazards etc
	PO12	3	Life long learning of all safety issues
CO4	PO1	2	Analyse the safety hazard
	PO2	3	Classificatio of hazards

	PO3	3	Solutions to different hazars
	P06	2	Life long learning of all safety issues
	P08	3	Ethics ilike corrective action
	PO12	3	Life long learning of safety issues

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Academic Year: 2022-23

S7 ECE (2019-23)

ECD415	Project Phase 1	2	Dr. Vishnu Rajan

CO1	Envisage applications for societal needs
CO2	Develop skills for analysis and synthesis of practical systems
CO3	Learn to use new tools effectively and creatively
CO4	Learns to carry out analysis and cost-effective, environmental friendly designs of engineering systems
CO5	Develops ability to write Technical / Project reports and oral presentation of the work done to an audience

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**					**3**	**3**	**3**	**3**		**3**	**3**
CO1		**3**	**3**	**3**					**3**			**3**
CO2					**3**				**3**			**3**
CO4		**3**	**3**	**3**	**3**	**3**	**3**		**3**		**3**	**3**
CO5									**3**	**3**	**3**	**3**

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	2		3
CO2		3	
CO3		3	2
CO4	3	3	2
CO5			2

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Justification

		Mapping	Justification
CO1	PO1	3	This is because engineering knowledge is applied to address societal needs and challenges, and envisioning applications for societal needs requires an understanding of engineering principles and technologies.
	PO6	3	This is because the program objective emphasizes the importance of engineers considering the broader social implications of their work, and envisioning applications for societal needs requires an understanding of the social context in which engineering solutions will be implemented.
	PO7	3	The correlation between the program objective of Environment and sustainability and the course objective of Environment and sustainability would be maximum (3) as both objectives are identical. The course objective directly aligns with the program objective, as it focuses on developing an understanding of environmental issues and promoting sustainable practices.
	PO8	3	While both objectives are related to societal issues, the program objective of Ethics is more focused on developing a framework for ethical decision-making, whereas the course objective of Envisaging applications for societal needs is more focused on identifying and addressing societal needs. However, there may be opportunities for students to consider ethical implications when addressing societal needs.
	PO9	3	While both objectives are important for developing well-rounded engineers, the program objective of Individual and team work is more focused on building interpersonal and collaborative skills, whereas the course objective of Envisaging applications for societal needs is focused on identifying and addressing societal needs. There may be some overlap in these areas, but they are not directly related.
	PO11	3	For addressing social needs in an efficient and effective manner, planning and project management is essential
	PO12	3	The program objective emphasizes the importance of continued learning and development, while the course objective is focused on identifying and addressing societal needs. While there may not be a direct relationship between these objectives, a commitment to life-long learning can help engineers better understand and address the evolving societal needs of their communities.
	PSO1	2	Program focuses on designing and implementing electronic

			systems, course on identifying societal needs. Skills developed can address needs, such as communication for disaster relief or medical applications
	PSO3	3	Program emphasizes applying electronic hardware and software to solve problems, course focuses on identifying societal needs. Tools developed can address societal issues in areas like healthcare or environmental monitoring
CO2	PO2	3	Program emphasizes problem analysis, course focuses on developing practical system analysis and synthesis skills. These skills complement each other in designing practical solutions.
	PO3	3	Program emphasizes designing/developing solutions, course focuses on developing practical system analysis and synthesis skills. These skills complement each other in creating effective solutions.
	PO4	3	Program emphasizes investigating complex problems, course focuses on developing practical system analysis and synthesis skills. These skills complement each other in problem-solving.
	PO9	3	Program emphasizes individual/teamwork, course focuses on developing practical system analysis and synthesis skills. These skills complement each other in collaborative projects.
	PO12	3	Program emphasizes life-long learning, and the course emphasizes developing practical system analysis and synthesis skills. These objectives are not directly related
	PSO2	3	Close correlation

CO3	PO5	3	Program emphasizes modern tool usage, course focuses on learning to use new tools effectively and creatively. These skills complement each other in adapting to technological advancements
	PO9	3	Program emphasizes individual/teamwork, course focuses on learning to use new tools effectively and creatively. These skills can be used collaboratively or individually to utilize new tools effectively.
	PO12	3	Program emphasizes life-long learning, course focuses on learning to use new tools effectively and creatively. Lifelong learning is key to keeping up with emerging tools and technologies.
	PSO2	3	To stay relevant, one needs to follow and adapt to the dynamic trends in electronics engineering and learn to use new tools

			effectively and creatively.
	PSO3	2	By using electronic hardware and software tools, engineers can develop innovative solutions for societal problems. The ability to learn and adapt to new tools is essential for keeping up with emerging technologies and trends.
CO4	PO2	3	The ability to carry out problem analysis is crucial in designing cost-effective and environmentally friendly engineering systems. This correlation emphasizes the importance of incorporating these skills in engineering education
	PO3	3	This is because designing and developing solutions require a thorough understanding of the problem, analysis, and cost-effective and environmentally friendly solutions.
	PO4	3	Conducting investigations of complex problems requires the ability to analyze and design effective solutions, which aligns with the objective of carrying out cost-effective and environmentally friendly designs of engineering systems
	PO5	3	There is a good correlation between the program objective of modern tool usage and the course objective of learning to carry out analysis and cost-effective environmental friendly designs, as modern tools enable efficient analysis and design.
	PO6	3	Engineers must consider the societal impact of their designs and strive for sustainable solutions
	PO7	3	The course objective is highly correlated to the program objective as it emphasizes developing cost-effective and environmentally friendly engineering solutions, aligned with the sustainability objective of the program.
	PO9	3	This is because working in a team and communicating with team members is essential to achieve effective and sustainable engineering designs
	PO11	3	While project management and finance courses may not directly relate to environmental engineering, they are important skills for effective and efficient execution of environmentally-friendly projects
	PO12	3	There is a high correlation between the program objective of life-long learning and the course objective of learning to carry out analysis and cost-effective, environmental friendly designs of engineering systems, as both require continuous skill development and adaptation to new technologies and practices.
	PSO1	3	To design and implement various types of electronic systems,

			one needs to have a good understanding of the fundamental knowledge of Electronics and Communication Engineering. Learning how to carry out cost-effective and environmentally friendly designs helps in creating efficient and sustainable systems.
	PSO2	3	Learning to adapt to dynamic trends in electronics engineering requires a deep understanding of current trends and how they relate to sustainable and cost-effective solutions. This can help in carrying out analysis and designing systems that are both environmentally friendly and practical.
	PSO3	2	By utilizing electronic hardware and software tools to analyze and design systems that are both cost-effective and environmentally friendly, students can effectively solve problems encountered by society
CO5	PO9	3	This is because effective communication is key to successful teamwork, and technical reports and presentations are essential tools for communicating engineering ideas and findings to colleagues and stakeholders. Developing these skills helps students to work collaboratively and effectively in teams, and prepares them to present their work professionally and confidently in both academic and industry settings.
	PO10	3	The ability to write technical/project reports and deliver effective oral presentations requires strong communication skills. Developing these skills through practice and feedback enhances the ability to effectively convey technical information to diverse audiences, both in written and spoken forms.
	PO11	3	While there may not be a direct correlation between the two objectives, they are both important skills for successful project management
	PO12	3	Lifelong learning can help individuals develop their ability to write technical or project reports and deliver oral presentations by providing opportunities for continuous learning and improvement of communication skills
	PSO3	2	The use of electronic hardware and software tools requires clear and concise reporting on the solutions found for societal problems, leading to the development of effective technical and project reports and oral presentations.

SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY, KODAKARA
Department of Electronics & Communication Engineering

Academic Year: 2022-23

S7 ECE (2019 –2023)

ECL 411	Electromagnetics Lab	4	CHINCHU JOSE/ AMBILY FRANCIS

CO1	Analyze the performance of microwave active and passive devices such as reflex klystron, Gunn diode, directional coupler etc.
CO2	Examine the various parameters such as frequency and wavelength associated with microwave circuits .
CO3	Generate the antenna radiation pattern using the HFSS tool
CO4	Test the performance of optical light sources (LEDs and Lasers), and to assess the characteristics of optical fibers.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2							3	3		
CO2	3	2							3	3		
CO3	3	2			3				3	3		2
CO4	3	2							3	3		

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3		
CO2	3		
CO3	3	3	2
CO4	3		

SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY, KODAKARA
Department of Electronics & Communication Engineering

Justification

		Mapping	Justification
CO1	PO1	3	Apply the knowledge of mathematics and engineering fundamentals to solve and derive the antenna parameters
	PO2	2	Analyse engineering problems first principles of mathematics and engineering sciences.
	PO9	3	Students function as a member in diverse teams to do experiments.
	PO10	3	Experiment report is being written after each experiment in the records.
	PSO1	3	Apply the fundamental knowledge of Electronics and Communication Engineering to design electronic systems in communication.
CO2	PO1	3	Apply the knowledge of mathematics and engineering fundamentals to solve and derive the antenna parameters
	PO2	2	Analyze engineering problems first principles of mathematics and engineering sciences.
	PO9	3	Students function as a member in diverse teams to do experiments.
	PO10	3	Experiment report is being written after each experiment in the records.
	PSO1	3	Apply the fundamental knowledge of Electronics and Communication Engineering to design electronic systems in communication.
CO3	PO1	3	Apply the knowledge of mathematics and engineering fundamentals to solve and derive the antenna parameters

	PO2	2	Analyze engineering problems first principles of mathematics and engineering sciences.
	PO5	3	Apply modern engineering tool-HFSS
	PO12	2	Will help the students to use the HFSS tool for higher levels.
	PSO1	3	Apply the fundamental knowledge of Electronics and Communication Engineering to design electronic systems in communication.
	PSO2	3	Follow and adapt to new software trends in the field of Electronics Engineering.
	PSO3	2	Apply electronic software tools to find the solutions for problems encountered by the society.
CO4	PO1	3	Apply the basic knowledge of mathematics to obtain the VI and PI characteristics of LEDs and Laser diodes.
	PO2	2	Analyze engineering problems first principles of mathematics and engineering sciences.
	PO9	3	Students function as a member in diverse teams to do experiments.
	PO10	3	Experiment report is being written after each experiment in the records.
	PSO1	3	Apply the fundamental knowledge in implementing various types of electronic systems .

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SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY, KODAKARA
Department of Electronics & Communication Engineering

Academic Year: 2022-23

S8 ECE (2019-23)

ECD416	Project Phase II	4	Dr. Vishnu Rajan

CO1	Demonstrate sound technical knowledge in the domain of the selected project topic
CO2	Develop the skills of independent and collaborative learning and acquire the knowledge and awareness to carry out cost-effective and environmental friendly designs
CO3	Gain the expertise to use new tools for the design and development
CO4	Develop the ability to write good technical report and to make oral presentation of the work carried out
CO5	Develops ability to demonstrate a product developed

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3								
CO1	3		3			2	2	2	3		3	3
CO2			3		3				3			2
CO4								3	3	3		3
CO5						3	3	3	3	3	3	3

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	3	
CO2			3
CO3	3	3	
CO4			
CO5	3		

Justification

SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY, KODAKARA
Department of Electronics & Communication Engineering

		Mapping	Justification
CO1	PO1	3	Through the course, students are expected to develop a high level of technical expertise and proficiency in their chosen field, enabling them to apply their knowledge effectively to real-world problems
	PO2	3	The ability to analyze a problem requires a strong understanding of the technical aspects involved in the domain.
	PO3	3	The ability to design or develop solutions in a particular domain requires a sound technical knowledge of that domain. Therefore, demonstrating sound technical knowledge in the domain of the selected project topic is essential to effectively design or develop solutions.
	PO4	3	The ability to conduct investigations of complex problems requires a deep understanding of the technical domain. Therefore, demonstrating sound technical knowledge is crucial to conducting effective investigations and proposing viable solutions.
	PSO1	3	Demonstrating sound technical knowledge in the domain of the selected project topic involves staying up to date with the latest trends and advancements in the field of Electronics Engineering. This ensures that the solutions developed are relevant and effective in addressing current and future challenges.
	PSO2	3	This is because the ability to effectively apply electronic tools and software requires a strong technical knowledge of the field, which is demonstrated through the successful implementation of solutions to real-world problems.
CO2	PO1	3	By applying engineering knowledge, students will learn to carry out cost-effective and environmental friendly designs, which requires independent and collaborative learning to acquire the necessary knowledge and awareness.
	PO3	3	The development of solutions requires continuous independent and collaborative learning to acquire the knowledge and awareness necessary to carry out cost-effective and environmentally friendly designs.
	PO6	2	By collaborative learning, engineers can build much more efficient solutions for the society
	PO7	2	It requires the ability to analyze the environmental and economic impact of different design choices and to develop innovative and cost-effective solutions that minimize negative

			environmental impacts while still meeting the needs of society.
	PO8	2	Collaborative learning enables us to act ethically
	PO9	3	They must respect diversity, work with integrity, and follow ethical principles while carrying out their duties. By promoting a culture of respect, collaboration, and ethical conduct, engineers can create a positive and inclusive work environment that fosters innovation and excellence.
	PO11	3	Develop skills for cost-effective, environment-friendly designs with independent and collaborative learning, including project management and finance.
	PO12	3	The course objective emphasizes the use of electronic hardware and software tools to solve real-world problems, which aligns with the program objective to design and implement electronic systems.
	PSO3	3	Develops the ability to continuously acquire new knowledge and adapt to changing technologies and industry practices for sustainable engineering solutions.

CO3	PO3	3	The course objective specifically focuses on gaining expertise in new tools for design and development, directly contributing to the program objective of designing or developing solutions.
	PO5	3	The course objective is directly aligned with the program objective, as gaining expertise in new tools is crucial for designing and developing modern solutions.
	PO9	3	Effective teamwork can enhance learning and utilization of new tools, resulting in improved design and development.
	PO12	2	The ability to use new tools requires continuous learning. The goal of lifelong learning correlates with gaining expertise in using new tools for design and development.
	PSO1	3	The fundamental knowledge of ECE is essential to design and implement electronic systems. Expertise in new tools enhances the ability to design and develop such systems.
	PSO2	3	The ability to follow and adapt to dynamic trends necessitates the use of new tools, technologies and techniques for design and development.
CO4	PO8	3	Plagiarism is one aspect that one needs to consider while preparing the technical report

	PO9	3	Individual and team work may involve collaborating with team members to produce a technical report or presentation
	PO10	3	Communication skills are essential to present technical work effectively. Writing good technical reports and making oral presentations require strong communication skills.
	PO12	3	Students are benefitted out of the process for their future life too
CO5	PO6	3	Demonstrating a product developed highlights the impact of engineering on society and emphasizes the role of an engineer in solving societal problems.
	PO7	3	The product can be designed to meet environmental and sustainable standards
	PO8	3	While doing the demonstration, it has to be done ethically and only truth must be told
	PO9	3	Students can showcase their teamwork and individual contributions to the development of the product through a presentation or demonstration.
	PO10	3	Develops ability to effectively communicate the features and benefits of the product to stakeholders and customers through various means, such as presentations, technical reports, and marketing materials.
	PO11	3	Effective project management and financial planning can lead to successful product development
	PO12	3	The ability to demonstrate a product developed shows a commitment to continuous learning and improvement, which is essential for life-long learning.
	PSO1	3	The ability to demonstrate a product developed is indirectly related to the fundamental knowledge of Electronics and Communication Engineering as it requires successful implementation of the designed electronic systems.

SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY, KODAKARA
Department of Electronics & Communication Engineering

Academic Year: 2022-23

S8 ECE (2019-23)

ECD416	Project Phase II	4	Dr. Vishnu Rajan

CO1	Demonstrate sound technical knowledge in the domain of the selected project topic
CO2	Develop the skills of independent and collaborative learning and acquire the knowledge and awareness to carry out cost-effective and environmental friendly designs
CO3	Gain the expertise to use new tools for the design and development
CO4	Develop the ability to write good technical report and to make oral presentation of the work carried out
CO5	Develops ability to demonstrate a product developed

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3								
CO1	3		3			2	2	2	3		3	3
CO2			3		3				3			2
CO4								3	3	3		3
CO5						3	3	3	3	3	3	3

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	3	
CO2			3
CO3	3	3	
CO4			
CO5	3		

Justification

SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY, KODAKARA
Department of Electronics & Communication Engineering

		Mapping	Justification
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	PO4	3	The ability to conduct investigations of complex problems requires a deep understanding of the technical domain. Therefore, demonstrating sound technical knowledge is crucial to conducting effective investigations and proposing viable solutions.
	PSO1	3	Demonstrating sound technical knowledge in the domain of the selected project topic involves staying up to date with the latest trends and advancements in the field of Electronics Engineering. This ensures that the solutions developed are relevant and effective in addressing current and future challenges.
	PSO2	3	This is because the ability to effectively apply electronic tools and software requires a strong technical knowledge of the field, which is demonstrated through the successful implementation of solutions to real-world problems.
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	PO3	3	The development of solutions requires continuous independent and collaborative learning to acquire the knowledge and awareness necessary to carry out cost-effective and environmentally friendly designs.
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	PO12	3	The course objective emphasizes the use of electronic hardware and software tools to solve real-world problems, which aligns with the program objective to design and implement electronic systems.
	PSO3	3	Develops the ability to continuously acquire new knowledge and adapt to changing technologies and industry practices for sustainable engineering solutions.

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	PO5	3	The course objective is directly aligned with the program objective, as gaining expertise in new tools is crucial for designing and developing modern solutions.
	PO9	3	Effective teamwork can enhance learning and utilization of new tools, resulting in improved design and development.
	PO12	2	The ability to use new tools requires continuous learning. The goal of lifelong learning correlates with gaining expertise in using new tools for design and development.
	PSO1	3	The fundamental knowledge of ECE is essential to design and implement electronic systems. Expertise in new tools enhances the ability to design and develop such systems.
	PSO2	3	The ability to follow and adapt to dynamic trends necessitates the use of new tools, technologies and techniques for design and development.
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CO5	PO6	3	Demonstrating a product developed highlights the impact of engineering on society and emphasizes the role of an engineer in solving societal problems.
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	PO12	3	The ability to demonstrate a product developed shows a commitment to continuous learning and improvement, which is essential for life-long learning.
	PSO1	3	The ability to demonstrate a product developed is indirectly related to the fundamental knowledge of Electronics and Communication Engineering as it requires successful implementation of the designed electronic systems.

SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY, KODAKARA
Department of Electronics & Communication Engineering

Academic Year: 2022-23

S8 ECE (2019 –2023)

ECT434	Secure Communication	3	Ambily Francis

CO1	Explain network security services and mechanisms and the types of attacks.
CO2	Apply the concepts of group, ring, field, modular arithmetic, Euclidean algorithm, Finite fields and polynomial arithmetic.
CO3	Illustrate the principles of modern symmetric encryption and decryption techniques like the Data Encryption Standard and Advanced Encryption Standard.
CO4	Outline the concepts of public key cryptography, RSA algorithm, key distribution and management for public key systems.
CO5	Explain the requirements for authentication and the types of functions used to produce an authenticator.

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											3
CO2	3	3										
CO3	3	3										2
CO4	3	3										2
CO5	3											3

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	2	3	
CO2	3		
CO3	3	2	
CO4	3	2	
CO5	2	3	

SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY, KODAKARA
Department of Electronics & Communication Engineering

Justification

		Mapping	Justification
CO1	PO1	3	Security services, mechanisms, attacks – apply the knowledge of science.
	PO12	3	Security services, mechanisms, attacks – scope for lifelong learning.
	PSO1	2	Security services, mechanisms, attacks – fundamentals of communication.
	PSO2	3	Security services, mechanisms, attacks – can follow the dynamic trends in communication.
CO2	PO1	3	Concepts of modular arithmetic – apply the knowledge of science.
	PO2	3	Concepts of modular arithmetic - problem analysis.
	PSO1	3	Concepts of modular arithmetic - fundamentals of electronics and communication
CO3	PO1	3	modern symmetric encryption and decryption - apply the knowledge of science.
	PO2	3	modern symmetric encryption and decryption - problem analysis.
	PO12	2	modern symmetric encryption and decryption - scope for lifelong learning.
	PSO1	3	modern symmetric encryption and decryption - fundamentals of communication.
	PSO2	2	modern symmetric encryption and decryption - follow dynamic trends in ECE.
CO4	PO1	3	public key cryptography, RSA algorithm, key distribution and management for public key systems – apply knowledge of science.
	PO2	3	public key cryptography, RSA algorithm, key distribution and management for public key systems – problem analysis.
	PO12	2	public key cryptography, RSA algorithm, key distribution and management for public key systems – scope for lifelong learning.

	PSO1	3	public key cryptography, RSA algorithm, key distribution and management for public key systems – fundamental knowledge of communication.
	PSO2	2	public key cryptography, RSA algorithm, key distribution and management for public key systems – can follow the dynamic trends in ECE.
CO5	PO1	3	Authentication – fundamental knowledge of science.
	PO12	3	Authentication – scope for lifelong learning.
	PSO1	2	Authentication – Fundamental knowledge of communication
	PSO2	3	Authentication – can follow dynamic trends in communication.