

**Mapping of Course
Outcomes with Program
Outcomes
B.Tech (2018 Scheme)**

Define the Program specific outcomes

PSO1	Graduate will be able to apply theoretical and practical knowledge of computer science for developing software solutions to the real time problems.
PSO2	Graduate will be able to apply and demonstrate the acquired knowledge of emerging trends and contemporary technologies in the field of computer science and engineering.

Define the Program outcomes

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	1	Slightly mapped as engineering fundamentals are required to solve complex problems.
	PO2	1	Slightly mapped as programming principles are used to apply to solve complex engineering problems.
	PO3	3	Highly mapped as programming solutions are made for health, safety and society, considering the environmental factors.
	PSO1	1	Slightly mapped as knowledge of programming is used for developing software solutions to the real time problems.
CO2	PO3	2	Moderately mapped as students learn to design/ develop solutions with these methods.
	PO5	1	Slightly mapped as appropriate techniques are learnt to write programs for complex engineering activities.
	PSO2	1	Slightly mapped as students will apply knowledge in solving computer science problems.
CO3	PO1	1	Slightly mapped as programming fundamentals are needed with respect to engineering problems.
	PO2	1	Slightly mapped as these programming principles are used to apply to solve complex engineering problems.
	PO3	2	Moderately mapped as students learn these methods to design and develop solutions for various programming problems.
	PO5	1	Slightly mapped as these programming techniques are learnt to write programs for complex engineering activities.
	PSO1	1	Slightly mapped as students learn to develop software solutions for real world problems.
CO4	PO1	2	Moderately mapped as these programming fundamentals help to solve engineering problems.
	PO3	3	Highly mapped as students learn to design and develop solutions for complex engineering problems related to programming, using this fundamental knowledge.
	PO5	1	Slightly mapped as these modules are learnt implemented to solve programs for complex engineering activities.
	PSO1	3	Strongly mapped as software solutions are developed for various real time problems.
CO5	PO1	1	Slightly mapped as students learn engineering fundamentals to solve complex engineering problems.
	PO2	1	Slightly mapped as students learn these techniques to solve complex engineering problems.
	PO3	2	Moderately mapped as these concepts are investigated and implemented to solve programs for complex engineering activities.

	communication over different medium.														
CO5	Utilize knowledge of routing and congestion control algorithms to overcome various issues over different complex networking structures.			3								3			
CO6	Discuss algorithms for medium access sub layer to avoid collision and error problems over different types of networks.	3	3												

Justification of mapping:

CO1	PO5	3	Strongly mapped to apply techniques and propose solutions to real world problems
	PSO1	3	Strongly mapped to real time problems in computer science field for networking
CO2	PO12	2	Moderately mapped to apply and analyze the concept LAN MAN WAN
CO3	PO5	1	Slightly mapped to formulate complex engineering problems
CO3	PO12	1	Slightly mapped to independent and lifelong learning's
CO4	PO4	2	Moderately mapped to research methods and design techniques
CO4	PSO2	2	Moderately mapped acquire knowledge of emerging trends
CO5	PO3	3	Strongly mapped to design congestion control algorithms
	PO10	3	Strongly mapped to communicate effectively within engineering applications
CO6	PO1	3	Strongly mapped to get knowledge of networking concept.
	PO2	3	Strongly mapped to communicate effectively within networking applications

Course Name: Digital Electronics

Course Code: ESCS-101

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO1 1	PO1 2	PO1 1	PSO 1	PSO 2
CO1	Understand the relationships	3		2			2			1		1	2		3	

	between boolean algebra, combinational logic, and sequential logic.													
CO2	Solve combinational logic problem formulation and logic optimization.	1	3		2	2	1					1	2	3
CO3	Construct digital logic circuits using gates and state-of-the art mux, rom, pla and pal units	1		2		3				2	1		2	
CO4	Create profound analysis and design of synchronous and asynchronous sequential circuits		3			3		1	2				2	
CO5	Design and inspect digital circuits to meet desired needs within realistic constraints.			3	2			1	1				2	2
CO6	Develop skills to build and troubleshoot digital circuits.			2		1		2			2	1		2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as the students will be able to understand logics.
	PO3	2	Moderately mapped as the students will be able to formulate the problem of logics.

	PO6	2	Moderately mapped as the students will be able to apply reasoning related issues in logics.
	PO9	1	Slightly mapped as the students will be able to function effectively in teams.
	PO11	1	Slightly mapped as the students will be able to demonstrate the knowledge and understand the engineering principles to apply logics.
	PO12	2	Moderately mapped as the students will be able to engage in life long learning.
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO1	1	Slightly mapped as the students will be able to understand logics.
	PO2	3	Strongly mapped as the students will be able to identify and formulate complex engineering problems.
	PO4	2	Moderately mapped as the students will be able to design and analyze data.
	PO5	2	Moderately mapped as the students will be able to apply appropriate complex engineering practices.
	PO6	1	Slightly mapped as the students will be able to apply reasoning related issues in logics.
	PO12	1	Slightly mapped as the students will be able to engage in lifelong learning.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	3	Strongly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO1	1	Slightly mapped as the students will be able to understand logics.
	PO3	2	Moderately mapped as the students will be able to formulate the problem of logics.
	PO5	3	Strongly mapped as the students will be able to apply appropriate techniques.
	PO10	2	Moderately mapped as the students will be able to effectively communicate.
	PO11	1	Slightly mapped as the students will be able to demonstrate the knowledge and understand the engineering principles to apply logics.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO4	PO2	3	Strongly mapped as the students will be able to identify and formulate complex engineering problems.
	PO5	3	Strongly mapped as the students will be able to apply appropriate techniques.
	PO7	1	Slightly mapped as the students will be able to demonstrate the knowledge of logics.

	derivative of functions of complex variable														
CO3	Evaluate integration of functions of complex variables	3													
CO4	Analyze probability spaces, random variables and different probability distribution	3													
CO5	Fit the given data into best fit curve	2													
CO6	Apply statistical methods for analyzing experimental data	3			3										

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	1	Apply the Knowledge of linear systems to solve complex engineering problems.
CO2	PO2	2	Analyze complex engineering problems and reaching conclusions using complex variables.
CO3	PO1	3	Apply the knowledge of integral calculus of complex variables to solve complex engineering problems.
CO4	PO1	3	Apply the knowledge of probability distributions to solve complex engineering problems.
CO5	PO1	2	Apply the knowledge of applied statistics solve complex engineering problems.
CO6	PO1	3	Apply the knowledge of statistics to solve complex engineering problems.
	PO4	3	Analysis and interpretation of data using the concepts of statistics.

Course Name: Human values and Professional

Course Code: HSMCS-101

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Discriminate between valuable and superficial in the life.						2		3				1		
CO2	Encourages students to discover what they consider valuable.						2			1					
CO3	Understand the value required to be a good human being and apply these values in real life						3		2						
CO4	Evaluate and modify the behavior.									1	3				
CO5	Understand fundamental and organizational duties and protect individual and social rights.							2							
CO6	Know about professional behavior, values and guiding principles.								3	1	2				

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
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	concerning various network technologies over different mediums and layers													
CO2	Apply the knowledge of different network components, transmission mediums and tools to solve various problems of communication.									2				2
CO3	Design and develop different network design and logical models of networking to solve network related problems.			3										
CO4	Utilize knowledge of modern network simulation tools to propose solution for efficient working of networks for real world problems.	3							3					
CO5	make use of various troubleshooting methods to overcome networking problems.				3									3
CO6	Function in								1					

	sequential circuits for engineering problems.													
CO3	Choose and compare the usage of appropriate techniques and tools to solve digital circuits problem.		1			1							1	
CO4	Apply the knowledge acquired to demonstrate the usage of digital circuits in computers at large.	1		3								3		
CO5	Utilize the knowledge and principles of digital electronics while working in multidisciplinary team formation								3		2		2	
CO6	Design simple digital systems based on these digital abstractions, using the "digital paradigm".				2		1					3		3

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as students could apply the knowledge of mathematics to solve digital circuits

			problems.
	PSO1	1	Slightly mapped as students could apply the practical knowledge of computer science to design real time digital circuits solutions
CO2	PO1	2	Moderately mapped as students could apply the knowledge of mathematics and engineering fundamentals to design combinational and sequential digital circuits
	PO3	3	Highly mapped as students could design combinational and sequential digital circuits considering social and environmental environments.
	PSO2	3	Highly mapped as the graduates can apply the emerging trends of CSE to develop combinational and sequential digital circuits
CO3	PO2	1	Slightly mapped as students could analyse various solutions and propose appropriate solutions to solve digital circuits.
	PO5	1	Slightly mapped as students could select and apply appropriate solutions to digital circuits understanding the limitations of each solution
	PSO1	1	Slightly mapped as students could apply the knowledge gained to propose appropriate solutions for real time digital circuits
CO4	PO1	1	Slightly mapped as students could apply the knowledge of mathematics and engineering fundamentals to design digital circuits
	PO3	3	Highly mapped as students could demonstrate the acquired knowledge to design solution for digital circuits
	PO12	3	Highly mapped as students could engage themselves to acquire more knowledge in a life-long manner and choose digital electronics as their career path.
CO5	PO9	3	Highly mapped as students could utilize the knowledge gained to work effectively in a team
	PO11	2	Moderately mapped as students could demonstrate the acquired knowledge to the project team in lieu of digital circuit design
	PSO1	2	Moderately mapped as students could apply practical knowledge and principles of digital electronics to find optimal solutions for real time digital circuits problems
CO6	PO4	2	Moderately mapped as students could investigate solutions using research-based literature and propose optimal solutions
	PO6	1	Slightly mapped as students could apply contextual knowledge to assess the digital system and design accordingly
	PO12	3	Highly mapped as students could engage themselves to

			acquire more knowledge in a life-long manner and choose digital electronics as their career path.
	PSO2	3	Highly mapped as the graduates can apply the emerging trends of CSE to develop simple digital systems

Course Name: Training-I

Course Code: TR-101

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	To acquire knowledge and skills related to different coding skills and to manage projects on globally acceptable platforms.	3									2	2		2	
CO2	To provide students with opportunities for practical and hands-on learning to work in teams.					2				2			3		2
CO3	To expose students to a work environment, common practices, cognitive abilities and work ethics in the field of computer science and engineering.						2		3						2
CO4	To demonstrate and practice good working ethics and to internalize excellence.				1				3					1	

CO5	To demonstrate pleasant interpersonal skills in developing understanding and appreciation of individual differences in building self-confidence.								2						2
CO6	To demonstrate presentation skills, report writing, good management, team spirit, managerial skills and quality delivery of projects undertaken.		2	2											2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as the students will be able to apply basic skills about project development, organization and implementation to provide solution for a problem.
	PO10	2	Moderately mapped as the students will be to communicate the gained knowledge.
	PO11	2	Moderately mapped as the students will be able to demonstrate learned skills on globally acceptable platforms.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO5	2	Moderately mapped as the students will be able to use learned techniques and tools to solve complex engineering problems.
	PO9	2	Moderately mapped as the students will be able to work individually and in teams as well.
	PO12	3	Strongly mapped as the students will be able to prepare for independent learning.
	PSO2	2	Moderately mapped as the students will be able to apply the

	speech techniques, content, purpose, strengths and weaknesses.													
CO3	Reference and quote correctly, and not infringe copyright.					2	1	1					1	1
CO4	Practice the unique qualities of professional rhetoric, writing and presentation style.	1		2	1	1							1	
CO5	Use a technical report to communicate information	1			1	1				2			1	
CO6	Follow the stages of the writing process (prewriting/writing/rewriting) and apply them to technical and workplace writing tasks	1		2		1							1	1

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained in basic components of technical report writing.
	PO2	1	Slightly mapped as the students will be able to identify and analyze the complex engineering problems in technical writing.
	PO4	2	Moderately mapped as the students will be able to use

			design principles to provide valid conclusions in understanding of technical writing.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO1	1	Slightly mapped as the students will be able to apply and analyze the knowledge gained in various delivery of speech techniques.
	PO2	2	Moderately mapped as the students will be able to identify and analyze the complex engineering problems in speech techniques.
	PO3	1	Slightly mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems related to infringement of copyright.
	PO4	1	Slightly mapped as the students will be able to use and analyze design principles to provide valid conclusions in speech delivery methods.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO3	PO6	2	Moderately mapped as the students will be to use the gained knowledge in professional engineering to provide valid conclusions in infringement of copyright.
	PO7	1	Slightly mapped as the students will be to understand and demonstrate the gained knowledge in professional engineering practice.
	PO8	1	Slightly mapped as the students will be able to make ethical use of professional engineering practices in IPR.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained in professional presentation style.
	PO3	2	Moderately mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems related to professional writing and presentation style.
	PO4	1	Slightly mapped as the students will be able to use design principles to provide valid conclusions in professional practices of writing and presentation style.
	PO6	1	Slightly mapped as the students will be to use the gained knowledge in professional engineering to provide valid conclusions in presentation and writing style.

	properties of modular arithmetic and explain their application in analysis and interpretation of data and synthesis of information to provide valid conclusions.													
CO3	Create, select and apply appropriate techniques to model real world problems using graphs.	1	2	3	2								2	3
CO4	Identify and formulate solutions of engineering problems related to counting and probability theory.		3				2							
CO5	Utilize the importance of discrete structures towards simulation of problems in multidisciplinary environments.							2		1				
CO6	Formulate a logical statement in terms of a symbolic expression and evaluate the truth				2	2								

value of compound statement.																			
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Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Knowledge of mathematical proofs, techniques and algorithms to solve complex engineering problem related to discrete structures.
	PO2	2	Obtaining conclusions using first principles of discrete mathematics.
	PO4	1	Apply knowledge of mathematics to perform analysis, synthesis of data to reach conclusion.
CO2	PO1	2	Knowledge of modular arithmetic, techniques and algorithms to solve complex engineering problem related to discrete structures.
	PO2	2	Obtaining conclusions using modular arithmetic properties to analyze problems.
	PO4	2	Apply knowledge of arithmetic to perform analysis, synthesis of data to reach conclusion.
CO3	PO1	1	Apply the knowledge of graph theory to obtain the solution of complex engineering problems.
	PO2	2	To analyze a complex engineering problem using graph theory.
	PO3	3	Design simulations or solution to complex engineering problems using graphs.
	PO4	2	Design, analyze and interpret data using graphs.
	PSO1	2	Apply theoretical and practical knowledge of graph theory for developing software solutions to the real time problems.
	PSO2	3	Apply and demonstrate the skills and knowledge of emerging trends and contemporary technologies using graphs in the field of computer science and engineering.
CO4	PO2	3	Identify, formulate solutions of engineering problems using principles of counting and probability.
	PO6	2	Apply reasoning backed with probability theory to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
CO5	PO9	2	Utilize the importance of discrete structures towards simulation of problems in multidisciplinary environments.
	PO11	1	Demonstrate discrete structure knowledge and apply it to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

CO6	PO4	2	Formulate a logical statement to perform synthesis of the information to provide valid conclusions
	PO6	2	Apply reasoning backed with propositional and predicate calculus to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Course Name: Computer Architecture and Microprocessor

Course Code: PCCS-104

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Identify computer systems, memory organization, microprocessor and assembly language programming.	3					2				2		3	2	2
CO2	Clarify instruction formats, risc and cisc architecture and different addressing modes.		2	2	3	1				2				3	
CO3	Solve basic binary math operations by using the instructions of microprocessor.		2	2				2	1	2					2
CO4	Compare between pipelining and parallelism.	2			2				2		2	2		2	
CO5	Design structured, well commented, understandable assembly language programs to provide solutions			3	2	2		2				2			2

	to real-world problems.													
CO6	Classify the trends and developments of microprocessor technology.	1			2	2		2				2	2	

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as the students will be able to apply the knowledge gained to find a feasible solution for the problems designed.
	PO6	2	Moderately mapped as the students will be able to apply his reasoning skills for professional engineering practices.
	PO10	2	Moderately mapped as the students will be able to communicate effectively on computer architectural activities.
	PO12	3	Strongly mapped as the students will be to use the gained knowledge in computer architecture practices for lifelong.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO2	2	Moderately mapped as the students will be able identify, formulate and analyze various computer architecture problems.
	PO3	2	Moderately mapped as the students will be able to design system components using RISC/CISC architecture.
	PO4	3	Strongly mapped as the students will be to use the gained knowledge to provide valid solutions through various instruction modes.
	PO5	1	Slightly mapped as the students will be to create, select and apply the various tools in computer architecture.
	PO9	2	Moderately mapped as the students will be able to apply the concepts learned individually and in teams.
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
CO3	PO2	2	Moderately mapped as the students will be able to identify, analyze complex microprocessor architectures.
	PO3	2	Moderately mapped as the students will be able to design complex microprocessor architectures which meet the specify needs.
	PO7	2	Moderately mapped as the students will be able to use understand the impact of microprocessor in society and Environment.
	PO8	1	Slightly mapped as the students will be to apply the ethical principles in engineering practice.

	PO9	2	Moderately mapped as the students will be able to apply the concepts learned individually and in team.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	2	Moderately mapped as the students will be able to apply the gained engineering knowledge in pipelining and parallelism.
	PO4	2	Moderately mapped as the students will be able to investigate problems related to parallelism.
	PO8	2	Moderately mapped as the students will be able to solve ethically the complex problems of pipelining.
	PO10	2	Moderately mapped as the students will be able to communicate effectively and write reports of parallel computing.
	PO11	2	Moderately mapped as the students will be able to understand the concept of computer architecture and apply these to one's own work.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO5	PO3	3	Strongly mapped as the students will be able to design assembly language programs and apply to real time problems.
	PO4	2	Moderately mapped as the students will be able to analyze and interpret the solution for assembly language problems.
	PO5	2	Moderately mapped as the students will be able to apply various tools for real time problems through assembly language programming.
	PO7	2	Moderately mapped as the students will be understand the real world problems in society and environment.
	PO11	2	Moderately mapped as the students will be able to make work effectively in project management of assembly programming.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO6	PO1	1	Slightly mapped as the students will be apply the gained engineering knowledge for developments in microprocessor technology.
	PO5	2	Moderately mapped as the students will be able to use various modern tools for developments of microprocessor technology.
	PO6	2	Moderately mapped as the students will be able to serve society using recent trends and developments of microprocessor technology.
	PO8	2	Moderately mapped as the students will be able to solve ethically the complex problems of microprocessor.
	PO12	2	Moderately mapped as the students will be able to apply the concepts learned in microprocessor in his/her lifelong learning.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO1 1	PO1 2	PO1 1	PSO 1	PSO 2
CO1	Understand the mechanisms of os to handle processes and threads and their communication.	2		1	2							2			2	1
CO2	Compare and contrast the mechanisms involved in memory management techniques	1	3	1	2										2	
CO3	Use the components of operating system in os design	2		1	2										2	1
CO4	Evaluate different scheduling techniques.	1	2	2	1										2	1
CO5	Investigate basic concepts towards process synchronization and related issues.	1	2	1	2										2	1
CO6	Understand the structure and organization of file system.	2		1	1			2							2	1

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to

			apply the knowledge gained to understand mechanisms of operating systems.
	PO3	1	Slightly mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems.
	PO4	2	Moderately mapped as the students will be able to use design principles to provide valid conclusions in mechanisms of OS.
	PO10	2	Moderately mapped as the students will be able to communicate the solutions easily.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained in memory management techniques.
	PO2	3	Strongly mapped as the students will be able to identify and analyze the complex engineering problems.
	PO3	1	Slightly mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems related to memory management.
	PO4	2	Moderately mapped as the students will be able to use design principles to provide valid conclusions in memory management methods.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO3	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained to use OS design and components.
	PO3	1	Slightly mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems in OS.
	PO4	2	Moderately mapped as the students will be able to use design principles of OS to provide valid conclusions.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained to evaluate scheduling methods.
	PO2	2	Moderately mapped as the students will be able to identify and analyze the complex engineering

			problems in scheduling techniques.
	PO3	2	Moderately mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems in scheduling techniques.
	PO4	1	Slightly mapped as the students will be able to use design principles to provide valid conclusions in scheduling methods.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO5	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained to process synchronization and related issues.
	PO2	2	Moderately mapped as the students will be able to identify and analyze the complex engineering problems in process synchronization related issues.
	PO3	1	Slightly mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems in process synchronization.
	PO4	2	Moderately mapped as the students will be able to use design principles to provide valid conclusions to investigate process synchronization related issues.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO6	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained to find a feasible solution for the problems designed related to structure of the file system.
	PO3	1	Slightly mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems related to structure of the file system.
	PO4	1	Slightly mapped as the students will be able to use design principles to provide valid conclusions in structure of file system.
	PO7	2	Moderately mapped as the students will be to understand and demonstrate the gained knowledge in professional engineering practice.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.

CO5	Demonstrate various methods of organizing large amounts of data and recognize systematic way to retrieve data and solve problems.		3	2	2									2	
CO6	Formulate new solutions for programming problems or improve existing code using learned algorithms and data structures.	2	1	2										2	

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as the students will be able to apply the knowledge gained to find a feasible solution for the problems designed.
	PO2	1	Slightly mapped as the students will be able to apply the knowledge gained to analyze a solution for the problems designed.
	PO3	3	Strongly mapped as the students will be able to apply the knowledge gained to design a solution for the problems designed.
	PSO1	3	Strongly mapped as the students will be able to apply the knowledge gained to find a feasible solution for the real time problems.
CO2	PO1	3	Strongly mapped as the students will be able to apply the knowledge gained to to identify the appropriate data structure to provide better solution .
	PO2	2	Moderately mapped as the students will be able to identify the appropriate data structure which can provide better solution to reduce space and time complexity.
	PO3	3	Strongly mapped as the students will be able to apply

			the knowledge gained to design the appropriate data structure for optimal solution .
	PO4	3	Strongly mapped as the students will be able to analyze the different data structure to compare various solutions having different space and time complexity..
CO3	PO1	1	Slightly mapped as the students will be able to apply the knowledge to understand the operations of different data structures to solve problems.
	PO2	3	Strongly mapped as the students will be able to analyze the different solutions using various data structures to solve problems.
	PO4	3	Strongly mapped as the students will be able to analyze the operations on different data structure to solve problems.
	PSO1	3	Strongly mapped as the students will be able to understand different kind of operations required to solve real time problems.
CO4	PO1	3	Strongly mapped as the students will be able to apply the knowledge to design appropriate algorithm to solve problems.
	PO2	1	Slightly mapped as the students will be able to identify the appropriate data structure to solve problems.
	PO3	3	Strongly mapped as the students will be able to apply the knowledge gained to design appropriate algorithm to model complex engineering activities.
	PSO1	2	Moderately mapped as the students will be able to apply the knowledge gained to find a feasible solution for the real time problems.
CO5	PO2	3	Strongly mapped as the students will be able to to analyze various methods of organizing large amounts of data and recognize systematic way to retrieve data for solving problems.
	PO3	2	Moderately mapped as the students will be able to select appropriate methods to organizing large amounts of data and will recognize systematic way to retrieve data for solving problems
	PO4	2	Moderately mapped as the students will be able to analyze the various methods of organizing large amounts of data and recognize systematic way to retrieve data for solving problems..
	PSO1	2	Moderately mapped as the students will be able to find appropriate method for organizing large amounts of data required to solve real time problems..
CO6	PO1	2	Moderately mapped as the students will be able to apply the knowledge to Formulate new solutions.

	PO2	1	Slightly mapped as the students will be able to analyze the new formulate solutions.
	PO3	2	Moderately mapped as the students will be able to apply the knowledge to Formulate new solutions.
	PSO1	2	Moderately mapped as the students will be able to design solutions for the problems in the field of CSE.

Course Name: Software Engineering

Course Code: PCCS-107

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Plan a software engineering process life cycle, including the specification, design, and implementation.		2	3						2	1			2	
CO2	Elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project.		3			2				1	3	2			3
CO3	Analyze and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology.		3	3	2			1						3	
CO4	Develop the code from the design and	2		2		3							3	1	2

	effectively apply relevant standards for quality management and practice.													
CO5	Formulate a testing strategy for a software system, employing techniques such as unit testing, test driven development and functional testing.			3			1			2				2
CO6	Identify modern engineering tools necessary for software reengineering and reverse engineering.					3		2	2	1			1	2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO2	2	Moderately mapped as the students will be able to identify and formulate a plan to process software life cycle.
	PO3	3	Strongly mapped as the students will be able to design and develop solutions.
	PO9	2	Moderately mapped as the students will be able to function effectively in teams.
	PO10	1	Slightly mapped as the students will be able to effectively communicate.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO2	3	Strongly mapped as the students will be able to identify and analyze software requirements.
	PO5	2	Moderately mapped as the students will be able to select tools for application of techniques.
	PO9	1	Slightly mapped as the students will be able to

			function effectively in teams.
	PO10	3	Strongly mapped as the students will be able to effectively communicate.
	PO11	2	Moderately mapped as the students will be able to demonstrate the knowledge and understand the software requirements.
	PSO2	3	Strongly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO2	3	Strongly mapped as the students will be able to identify and analyze software requirements.
	PO3	3	Strongly mapped as the students will be able to design and develop solutions for SE methodology.
	PO4	2	Moderately mapped as the students will be able to design and analyze data.
	PO7	1	Slightly mapped as the students will be able to translate specification into design.
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
CO4	PO1	2	Moderately mapped as the students will be able to apply the knowledge of engineering fundamentals to get a feasible solution.
	PO3	2	Moderately mapped as the students will be able to design and develop solutions for SE methodology.
	PO5	3	Strongly mapped as the students will be able to select tools for application of techniques.
	PO12	3	Strongly mapped as the students will be able to engage in life-long learning.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO5	PO3	3	Strongly mapped as the students will be able to design and develop solutions for SE methodology.
	PO6	1	Slightly mapped as the students will be able to apply reasoning for the testing techniques.
	PO9	2	Moderately mapped as the students will be able to function effectively in teams.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO6	PO5	3	Strongly mapped as the students will be able to select tools for application of techniques.
	PO7	2	Moderately mapped as the students will be able to translate specification into design.
	PO8	2	Moderately mapped as the students will be able to apply and identify modern tools for software processes.

	instruction set by designing code for arithmetic, logical and data transfer operations.													
CO6	Solve basic binary math operations by using the instructions of microprocessor.				2						2		2	

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO2	2	Moderately mapped as the students will be able identify, formulate and analyze various computer architecture problems.
	PO3	2	Moderately mapped as the students will be able to design system components using RISC/CISC architecture.
	PO5	2	Moderately mapped as the students will be to create, select and apply the various tools in computer architecture.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO1	2	Moderately mapped as the students will be able to apply the gained engineering knowledge in pipelining and parallelism.
	PO4	2	Moderately mapped as the students will be able to investigate problems related to parallelism.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO1	2	Moderately mapped as the students will be able to apply the gained engineering knowledge in pipelining and parallelism.
	PO7	2	Moderately mapped as the students will be understand the real world

	principles used in the design of modern operating systems.													
CO2	Execute linux commands for files and directories, creating and viewing files, file comparisons and disk related commands.	2		2	2								2	1
CO3	Utilize the concept of virtualization for creating a virtual machine and installing operating system on virtual machine.	2		1		2							2	1
CO4	Demonstrate shell programming by using shell variables and shell keywords for automated system tasks.	1	1	2	1								2	1
CO5	Identify the key characteristics of multiple approaches used for the design and development of the operating system.	1	1	3	2								2	
CO6	Apply system commands for performing the file manipulation, program execution,	1		2	1	1	2						2	1

and printing text.														
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Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to apply the gained knowledge in modern operating systems.
	PO2	1	Slightly mapped as the students will be able to analyze the services and architectures for design of modern operating system.
	PO3	2	Moderately mapped as the students will be able to design solutions for modern operating system.
	PO5	3	Strongly mapped as the students will be able to use Modern operating system.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO1	2	Moderately mapped as the students will be able to apply the gained knowledge in Linux and disk related commands.
	PO3	2	Moderately mapped as the students will be able to provide solutions to perform Linux and disk relating commands.
	PO4	2	Moderately mapped as the students will be able to use and execute commands to provide valid conclusions.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO1	2	Moderately mapped as the students will be able to apply the gained knowledge for creating and installing operating system on virtual machine.
	PO3	1	Slightly mapped as the students will be able to design solutions for utilizing the concept of virtualization on virtual machine.
	PO5	2	Moderately mapped as the students will be able to use operating system on virtual machine.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	1	Slightly mapped as the students will be able to apply the gained knowledge in shell programming using automated system tasks.
	PO2	1	Slightly mapped as the students will be able to

			analyze the system tasks with shell programming.
	PO3	2	Moderately mapped as the students will be able to design solutions to perform shell programming for automated system tasks.
	PO4	1	Slightly mapped as the students will be able to demonstrate shell programming to provide valid conclusions.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
C05	PO1	1	Slightly mapped as the students will be able to identify and apply the gained knowledge for the development of operating system.
	PO2	1	Slightly mapped as the students will be able to identify and analyze the approaches used for the development of the operating system.
	PO3	3	Strongly mapped as the students will be able to identify and design solutions for development of modern operating system.
	PO4	2	Moderately mapped as the students will be able to identify multiple approaches for development of modern operating system to provide valid conclusions.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
C06	PO1	1	Slightly mapped as the students will be able to apply the gained knowledge in system commands.
	PO3	2	Moderately mapped as the students will be able to design solutions to perform file manipulation and program execution using system commands.
	PO4	1	Slightly mapped as the students will be able to use and apply system commands to provide valid conclusions.
	PO5	1	Slightly mapped as the students will be able to use and apply system commands.
	PO6	2	Moderately mapped as the students will be able to apply the gained knowledge to execute system commands.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.

CO6	Developing an awareness of the data structure for storing data and handling various operations on different applications in the broadest context of technology change.	1		2		3												2
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Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as the students will be able to apply the knowledge gained to find a feasible solution for the problems designed.
	PO5	2	Moderately mapped as the students will be able analyze different data structures and models to implement it.
	PO7	1	Slightly mapped as the students will be able to use the gained knowledge lifelong.
	PO11	2	Moderately mapped as the students will be to use the gained knowledge in multidisciplinary environment.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO1	3	Strongly mapped as the students will be able to apply the knowledge gained to find a feasible solution for the problems designed
	PO2	3	Strongly mapped as the students will be able to Evaluate and analyze the complexity of Data structures
CO3	PO3	3	Strongly mapped as the students will be able to design the solution of complex engineering problems
	PO5	3	Strongly mapped as the students will be able to use scheduling tools to provide valid conclusions.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO4	PO2	3	Moderately mapped as the students will be able to analyze complex engineering problems.
	PO4	3	Strongly mapped as the students will be able to practice each data structures to provide valid conclusions to real world problem
	PSO1	3	Moderately mapped as the students will be able to apply the

			gained knowledge in real time problems.
CO5	PO3	2	Moderately mapped as the students will be able to compare the different data structures.
	PO4	3	Strongly mapped as the students will be able to apply the knowledge data structures to find the valid conclusion.
	PO5	3	Strongly mapped as the students will be able to apply the knowledge data structures to find the valid conclusion.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO6	PO1	1	Slightly mapped as the students will be able to analyze complex engineering problems
	PO3	2	Moderately mapped as the students will be able to design the solution of complex engineering problems.
	PO5	3	Strongly mapped as the students will be able to apply the knowledge data structures to find the valid conclusion..
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.

Course Name: Environmental Sciences

Course Code: MCCA-101

CO#	Statements	PO	PO1	PO1	PO1	PSO	PSO								
		1	2	3	4	5	6	7	8	9	0	1	2	1	2
CO1	Measure environmental variables and interpret results.		3												
CO2	Evaluate local, regional and global environment topics related to resource use and management.		3		3										
CO3	Propose solutions to environmental problems related to resource use and management.							3							
CO4	Interpret the results of scientific studies of environmental							2							

	problems														
CO5	Describe threats to global biodiversity, their implications and potential solutions.			2				2							

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO2	3	Strongly mapped as the students will be able to measure environmental variable and interpret results.
CO2	PO2	3	Strongly mapped as the students will be able to measure environmental variable and interpret results
	PO4	3	Highly mapped as the students will be able to apply the gained knowledge in real time problems
CO3	PO7	3	Strongly mapped as the students will be able to understand the need for sustainable development.
CO4	PO7	2	Moderately mapped as the students will be able to understand the need for sustainable development.
CO5	PO3	2	Moderately mapped as the students will be able to understand the need of sustainable development.
	PO7	2	Moderately mapped as the students will be able to understand the need for sustainable development.

Course Name: Artificial Intelligence

Course Code: PCCS-108

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Understand the concept of artificial intelligence, agents, their types and structure.	2				1	2		1	1			1	2	1
CO2	Apply and analyze search strategies to solve the informed and uninformed problems.	1	3		3	1							2	3	2
CO3	Design and evaluate intelligent expert		1	3	2	3		2					1	2	3

	models for perception and prediction from intelligent environment.														
CO4	Formulate valid solutions for problems involving uncertain inputs or outcomes by using decision making techniques.		2	2	2			1		2	1	2			2
CO5	Demonstrate and enrich knowledge to select and apply ai tools to synthesize information and develop models within constraints of application area.	2			2	3							1	2	1
CO6	Examine the issues involved in knowledge bases, reasoning systems and planning.	1					2	2					2	2	2

Justification of mapping:

CO Number	PO/PS O Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to understand the concept and give a feasible solution.
	PO5	1	Slightly mapped as the students will be able to appropriate techniques for tool usage.
	PO6	2	Moderately mapped as the students will be able to apply the knowledge gained to find a feasible solution for the problems designed.
	PO8	1	Slightly mapped as the students will be able to apply and analyze strategies.

	PO9	1	Slightly mapped as the students will be able to function effectively and do team work.
	PO12	1	Slightly mapped as the students will be able to understand and manage the engineering practice.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO1	1	Slightly mapped as the students will be able to understand the concept and give a feasible solution.
	PO2	3	Strongly mapped as the students will be able to identify and analyze complex engineering problems.
	PO4	3	Strongly mapped as the students will be able to design and analyze experiments.
	PO5	1	Slightly mapped as the students will be able to apply appropriate techniques for tool usage.
	PO12	2	Moderately mapped as the students will be able to understand and manage the engineering practice.
	PSO1	3	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO3	3	Strongly mapped as the students will be able to design and implement solutions.
	PO4	2	Moderately mapped as the students will be able to design and analyze experiments.
	PO7	2	Moderately mapped as the students will be able to design and analyze experiments.
	PSO2	3	Strongly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO2	2	Moderately mapped as the students will be able to to identify and analyze complex engineering problems.
	PO3	2	Moderately mapped as the students will be able to able to design and implement solutions.

CO1	Analyze the information systems as socio-technical systems, its need and advantages as compared to traditional file based systems.		1				1						1	
CO2	To study the physical and logical database designs, database modeling, relational, hierarchical, and network models	1				1								
CO3	Analyze database design using e-r data model by identifying entities, attributes, relationships, generalization and specialization along with relational algebra.		3		2								3	
CO4	To understand and use data manipulation language to query, update, and manage a database			3		2							2	2
CO5	Apply and create relational database design process with normalization and denormalization of data.		2	3	1								1	1
CO6	To develop an understanding of essential dbms concepts such as: database security,						2	2						

integrity, concurrency														
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Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO2	1	Slightly mapped as the students will be able to analyze the Information Systems, its need and advantages as compared to traditional file based systems .
	PO6	1	Slightly mapped as the students will be able to analyze the Information Systems to assess legal issues and the consequent responsibilities relevant to the professional engineering practice.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO1	1	Slightly mapped as the students will be able to apply the DBMS concepts in database problems.
	PO6	1	Slightly mapped as the students will be able to apply the knowledge of DBMS concepts to assess legal issues and the consequent responsibilities relevant to the professional engineering practice.
CO3	PO2	3	Strongly mapped as the students will be able to analyze a database problem to design Database model for it.
	PO4	2	Moderately mapped as the students will be able to analyze Database model for a database problem.
	PSO1	3	Strongly mapped as the students will be able to design database model for a database to solve a real time problems.
CO4	PO3	3	Strongly mapped as the students will be able to design a database to solve complex engineering problem and meet the specified needs
	PO5	2	Moderately mapped as the students will be able to design a database using database tools.
	PSO1	2	Moderately mapped as the students will be able to design database to solve a real time problems.
CO5	PO2	2	Moderately mapped as the students will be able to analyze a database problem to apply Normalization of data to reduce complexity.
	PO3	3	Strongly mapped as the students will be able to design a Normalized database to solve complex engineering problem and meet the specified needs.

	properties of physical machines and be able to specify the possible inputs, processes and outputs of these machines.													
CO5	Compare and analyze different computational models including prediction and modeling to complex engineering activities with an understanding of the limitations.			3	2								1	
CO6	Recognize and comprehend formal reasoning about machines and languages to engage in independent and life-long learning in the broadest context of technological change.	2										3		

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as the students will be able to apply the knowledge to solve complex engineering problems related to automata theory.
	PO2	1	Slightly mapped as the students will be able to apply the knowledge to identify, formulate and analyze the complex engineering problems related to automata theory.
	PO3	1	Slightly mapped as the students will be able to apply the knowledge to solve complex engineering problems related to automata theory.
	PSO1	2	Moderately mapped as the students will be able to

			apply the gained knowledge in real time problems.
CO2	PO2	2	Moderately mapped as the students will be able to analyze uses and Constraints of various computational models used in engineering practice to solve problems.
	PO4	2	Moderately mapped as the students will be able to use research methods including analysis and interpretation of data, and synthesis of the information to analyze uses and constraints of various computational models used in engineering practice to solve problems.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
CO3	PO1	1	Slightly mapped as the students will be able to apply the knowledge of grammars to solve complex engineering problems related to automata theory.
	PO4	3	Strongly mapped as the students will be able to use research-based knowledge to abstract the models of computing and their powers to recognize the grammars.
	PSO1	1	Slightly mapped as the students will be able to make use of research-based knowledge to abstract the models of computing and their powers to recognize the grammars.
CO4	PO1	3	Strongly mapped as the students will be able to apply the knowledge to Design and evaluate abstract machines related to automata theory.
	PO2	1	Slightly mapped as the students will be to identify and formulate the Design the abstract machines related to automata theory.
	PO3	3	Strongly mapped as the students will be able to apply the knowledge to Design abstract machines to solve complex engineering problems related to automata theory.
	PO4	3	Strongly mapped as the students will be able to use research-based knowledge to Design abstract machines
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge to design solutions of real time problems.
CO5	PO4	3	Strongly mapped as the students will be able to use research-based knowledge to Compare and analyze different computational models i
	PO5	2	Moderately mapped as the students will be able to predict and model for the recognition of grammars designed for problems.

CO6	Categorize various problems based on the complexity and properties of algorithms that solves these problems.	3	3		3										
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Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Students will be able to apply their knowledge of engineering to learn and understand the fundamental techniques for designing algorithms which in turn will be used for the solution of complex engineering problems.
CO2	PO1	1	Students will be using their advanced techniques for designing algorithms for the solution of complex engineering problems.
	PO2	1	Students will be using their advanced techniques for designing algorithms for identifying and analyzing the complex engineering problem
	PO3	1	Students will be using their advanced techniques for designing algorithms for designing the solution for complex engineering problem
CO3	PO1	3	Students will be using the basic and advanced algorithm designing techniques for the solution of complex engineering problems.
	PO2	3	Students will be using the basic and advanced algorithm designing techniques for identifying and analyzing the complex engineering problem
	PO3	3	Students will be using the basic and advanced algorithm designing techniques for designing the solution for complex engineering problem
	PSO1	3	Students will be using the basic and advanced algorithm designing techniques for designing software solutions to the real time problems.
	PSO2	3	Students will be using the basic and advanced algorithm designing techniques in the field of computer science and engineering for understanding the problem and providing solution to it.
CO4	PO1	2	Students will be able to identify and design algorithms using existing algorithms based on advanced techniques for the solution of complex

	software projects.													
CO2	Analyse the various software development environments and risk management.	2	3			1								1
CO3	Develop and apply the key strategies to monitor, control and quality assurance of software projects.		2								3		3	
CO4	Select the appropriate planning and estimation models to better evaluate the software projects.				2	2								1
CO5	Create a strong working knowledge of ethics and professional responsibility.							3	3				1	2
CO6	Develop effective organisational, leadership and change skills for managing projects, teams and stakeholders.									3	3			3

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	1	Slightly mapped as students need to apply mathematical and engineering knowledge to calculate the activity timing in project management
	PO3	2	Moderately mapped as students need to design appropriate solutions for project activities
	PSO1	1	Slightly mapped as students can develop project management solutions.
CO2	PO1	2	Moderately mapped as students need to calculate cost

			benefit analysis and other activities for designing solutions
	PO2	3	Highly mapped as students need to analyse various risks using critical paths with the help of various software environments. And, accordingly, design solutions for successful completion of the project.
	PO5	1	Slightly mapped as students can explore and use various modern project management software.
	PSO2	1	Slightly mapped as students shall be capable to analyse various risks and propose solutions to project management using the acquired knowledge of latest technologies in project management
CO3	PO2	2	Moderately mapped as students shall be able to analyse various software configuration strategies to plan the project
	PO11	3	Highly mapped as the students shall apply knowledge gained monitor and control the project teams to manage the software project development
	PSO1	3	Highly mapped as students could apply the knowledge gained to monitor and control the development of real-time software projects.
CO4	PO4	2	Moderately mapped as students could conduct investigation and appropriately evaluate the software projects to give conclusive solutions
	PO5	2	Moderately mapped as students could conduct investigation using modern IT software management tools to appropriately evaluate the software projects to give conclusive solutions
	PSO1	1	Slightly mapped as students could appropriately propose software solutions to real-time software projects
CO5	PO8	3	Highly mapped as students could apply the strong ethics and act responsibly to manage software project teams
	PO9	3	Highly mapped as students could ethically manage multi-task teams as a leader in the development of software projects
	PO12	1	Slightly mapped as students could engage in life-long learning and applicability of social ethics in working environments
	PSO2	2	Moderately mapped as students could apply the acquired knowledge of modern tools ethically and professionally
CO6	PO10	3	Highly mapped as the students could effectively communicate among project teams and present effective presentations to demonstrate the timeline of

			various activities
	PO11	3	Highly mapped as students could develop effective financial management skills and later apply them for effective management of projects and display the analysis to stakeholders
	PSO2	3	Moderately mapped as students could apply the acquired knowledge of modern tools to develop effective organisational, leadership and change skills for managing projects, teams and stakeholders.

Course Name: Advanced Computer Networks

Course Code: PECS-106

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Understand the core ideas of networks thoroughly with network architecture and performance metrics for network designing.	3	2	2	2										
CO2	Apply the knowledge of various modes of communication to solve problems of data communication over different medium using various technologies.		3	2	2										
CO3	Understand and utilize various communication protocols that provide reliable, ordered, and error-checked delivery of a stream of octets.	1	3	2	2										
CO4	Design and implement various algorithms of		3	3	3	2							1	3	

	network to ease the communication problems over different geographical areas.														
CO5	Compare different routing protocols and propose the optimal solution concerning different structures of networks.			2	3	2									
CO6	Design and implementation of routing and transport layer protocols for advanced multi hop networks for smooth flow of data over different networks.			2	2	1									2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as the students will be able to understand the core ideas of networks thoroughly with network architecture and performance metrics for network designing
	PO2	2	Moderately mapped because students will learn about networks thoroughly with network architecture and its performance metrics to identify and formulate the engineering problems in the field of networks.
	PO3	2	Moderately mapped because students will learn about networks thoroughly with network architecture and its performance metrics that is beneficial for developing the solution for network related engineering problems
	PO4	2	Moderately mapped because students will learn about networks thoroughly with network architecture and its

			performance metrics that is beneficial for investigating the complex problems and providing the valid conclusions.
CO2	PO2	3	Strongly mapped, after studying the various modes of communication fundamentals, students will able to identify and formulate the complex engineering problems.
	PO3	2	Moderately mapped, after studying the various modes of communication fundamentals that meet the specified needs for developing the solution for network related engineering problems.
	PO4	2	Moderately mapped as knowledge about various communication modes to solve problems of data communication over different medium using various technologies for designing the the solution for network related engineering problems.
CO3	PO1	1	Slightly mapped as the students will be able to engineering fundamentals i.e. understand and utilize various communication protocols.
	PO2	3	Strongly mapped as students will able to utilize various communication protocols that provide reliable, ordered, and error-checked delivery of a stream of octets for able to identify and formulate the complex engineering problems.
	PO3	2	Moderately mapped as students will able to utilize various communication protocols that provide reliable, ordered, and error-checked delivery of a stream of octets for designing solution of complex engineering problems.
	PO4	2	Moderately mapped as students will able to utilize various communication protocols that provide reliable, ordered, and error-checked delivery of a stream of octets for designing, interpreting of data and providing the valid conclusions for complex problems in the field of computer networks.
CO4	PO2	3	Strongly mapped as students will able to design and implementation of various algorithms of network for complex problems in the field of computer networks.
	PO3	3	Strongly mapped as students will able to design and implementation of various algorithms of network for

			complex problems in the field of computer networks.
	PO4	3	Strongly mapped as students will able to utilize various communication protocols that provide reliable, ordered, and error-checked delivery of a stream of octets for designing, interpreting of data and providing the valid conclusions for complex problems in the field of computer networks.
	PO5	2	Moderately mapped as, students will able to design and implementation of various algorithms of network for complex problems in the field of computer networks using modern IT tools .
	P12	1	Slightly mapped because knowledge of design concepts of various algothms of networks will be beneficial for lifelong in the broadest context of technological change
	PSO1	3	Strongly, Knowledge of design concepts of various algothms of networks solutions will help to for developing software solutions to the real time problems.
CO5	PO3	2	Moderately mapped as students will able to compare different routing protocols to identify and formulate the complex engineering problems.
	PO4	3	Strongly mapped as, students will able to compare different routing protocols and propose the optimal solution concerning different structures of networks that is helpful for designing and providing the valid conclusions for complex problems in the field of computer networks
	PO5	2	Moderately mapped as, students will able to compare and proposing routing algorithm that provides the optimal solution concerning different structures of networks using modern IT tools .
CO6	PO3	2	Moderately mapped as students will able to design and implementation of routing and transport layer protocols for advanced multi hop networks
	PO4	2	Moderately mapped as students will able to design and implementation of routing and transport layer protocols for advanced multi hop networks complex problems in the field of computer networks
	PO5	1	Slightly mapped as students will able to design and

CO4	To solve different types of statistics related problems with well-defined solutions, and tackle open-ended problems that belong to the disciplinary-area boundaries;			3	3								3	
CO5	To understand basic components of hypothesis testing and perform hypothesis tests on population means, variances and proportions.		1	1										
CO6	To perform statistical analysis in several circumstances and interprets the results in an applied context.					1								1

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	1	Slightly mapped to understand basic knowledge of probability and combinatorial analysis
CO2	PO2	3	Strongly mapped to identify variables and to solve probabilistic problems
CO3	PO4	3	Strongly mapped to apply knowledge of sampling distributions
CO4	PO4	3	Strongly mapped to conduct analysis and interpretation of data
	PO5	3	Strongly mapped to apply statistical techniques and tools for prediction and modeling of engineering activities
	PSO1	3	Strongly mapped to apply statistics to solutions for real life problems in computer science field
CO5	PO2	1	Slightly mapped to formulate hypothesis tests on population parameters for analysis of problems
	PO4	1	Slightly mapped to analyze and interpret the data for valid

system from scratch.														
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Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO3	3	Strongly mapped as the students will be able to design and develop solutions.
	PO5	2	Moderately mapped as the students will be able to select tools for application of techniques.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO2	2	Moderately mapped as the students will be able to understand the issues and provide solutions.
	PO12	1	Slightly mapped as the students will be able to engage in life-long learning.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO3	PO4	3	Strongly mapped as the students will be able to design and analyze data.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	2	Moderately mapped as the students will be able to apply the knowledge of engineering fundamentals to get a feasible solution.
	PO2	2	Moderately mapped as the students will be able to understand the issues and provide solutions.
	PO3	3	Strongly mapped as the students will be able to design and develop solutions.
	PO9	2	Moderately mapped as the students will be able to function effectively in teams.
	PO12	2	Moderately mapped as the students will be able to engage in life-long learning.
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
CO5	PO3	2	Moderately mapped as the students will be able to design and develop solutions for information retrieval.
	PO10	2	Moderately mapped as the students will be able to effectively communicate.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO6	PO3	2	Moderately mapped as the students will be able to

CO6	Identify the most common pitfalls of code using debuggers and be able to locate, analyze, and fix the errors.	1	1	1	1	1									1	1
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Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	1	Students will be able to understand the relationship between software and machine architecture which will be used for the solution of complex engineering problems.
	PO3	1	Students will be able to understand the relationship between software and machine architecture for identifying and analyzing the complex engineering problem
	PSO1	1	Students will be able to understand the relationship between software and machine architecture for designing software solutions to the real time problems.
	PSO2	1	Students will be able to understand the relationship between software and machine architecture in the field of computer science and engineering.
CO2	PO1	3	Students will be able to study the architecture of a hypothetical machine, its assembly language and macro language which will be used for the solution of complex engineering problems.
	PO2	3	Students will be able to study the architecture of a hypothetical machine, its assembly language and macro language; the knowledge of which the students will be using for identifying and analyzing the complex engineering problem
	PSO1	3	Students will be able to study the architecture of a hypothetical machine, its assembly language and macro language for designing software solutions to the real time problems.
	PSO2	3	Students will be able to study the architecture of a hypothetical machine, its assembly language and macro language in the field of computer science and engineering.

CO3	PO1	3	Student will be able to identify the need and implementation of macro processor, linkers and loaders which will be used for the solution of complex engineering problems.
	PSO1	3	Student will be able to identify the need and implementation of macro processor, linkers and loaders for designing software solutions to the real time problems.
	PSO2	3	Student will be able to identify the need and implementation of macro processor, linkers and loaders in the field of computer science and engineering.
CO4	PO1	3	Students will be able to determine the basics of compiler design and their applications in programming languages which will be used for the solution of complex engineering problems.
	PO2	3	Students will be able to determine the basics of compiler design and their applications in programming languages for identifying and analyzing the complex engineering problem
	PO3	3	Students will be able to determine the basics of compiler design and their applications in programming languages for designing the solution for complex engineering problem
	PO4	3	Students will be able to determine the basics of compiler design and their applications in programming languages for providing valid conclusions
	PSO1	3	Students will be able to determine the basics of compiler design and their applications in programming languages for designing software solutions to the real time problems.
	PSO2	3	Students will be able to determine the basics of compiler design and their applications in programming languages in the field of computer science and engineering.
CO5	PO1	2	Students will be able to analyze the process of scanning and parsing techniques which will be used for the solution of complex engineering problems.
	PO2	2	Students will be able to analyze the process of scanning and parsing techniques for identifying and analyzing the complex engineering problem
	PO3	2	Students will be able to analyze the process of scanning and parsing techniques for designing the solution for complex engineering problem
	PO4	2	Students will be able to analyze the process of

CO1	Design and implement efficient uninformed search techniques to solve problems.			2									2	
CO2	Apply the knowledge of different informed search to identify and implement the appropriate techniques in problem solving.	2	1										2	
CO3	Utilize knowledge and techniques of game playing to develop single player game.	2		2		1							2	
CO4	Handle uncertainty by designing the bayesian network and inferring from the given data.			3										2
CO5	Utilize the knowledge and techniques of artificial intelligence while working in multidisciplinary teams.	3							3					3
CO6	Design and develop projects using artificial intelligence tools and techniques.			3		2					2		3	

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO3	2	Moderately mapped as the students will be able design solutions using uninformed search techniques .

CO1	Understand, analyze and apply common sql statements including ddl, dml and dcl statements to perform different operations.		1		2	2				1					3
CO2	Design different views of tables for different users and to apply embedded and nested queries.			3		2					1		2	2	
CO3	Design and implement a database for a given problem according to well known design principles that balance data retrieval performance with data consistency.		3	2					3						3
CO4	Demonstrate and understand relational algebra in database which is helpful to design related database software components.	1	1				1	2					1	2	
CO5	Identify the user requirements from a typical business situation, and to document them.									1		1			3
CO6	Emphasize on team work and developing database applications using modern database tools					2				3					

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO2	1	Slightly mapped as the students will be able to identify and analyze complex engineering problems.
	PO4	2	Moderately mapped as the students will be able to use research based methods for SQL statements.
	PO5	2	Moderately mapped as the students will be able to apply appropriate techniques for SQL statements.
	PO9	1	Slightly mapped as the students will be able to function effectively on respective statements.
	PSO2	3	Strongly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO3	3	Strongly mapped as the students will be able to design different views for different tables.
	PO5	2	Moderately mapped as the students will be able to apply appropriate techniques for SQL statements.
	PO10	1	Slightly mapped as the students will be able to communicate effectively on engineering activities.
	PO12	2	Moderately mapped as the students will be able to engage in lifelong learning of commands.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO3	PO2	3	Strongly mapped as the students will be able to identify and analyze complex engineering problems.
	PO3	2	Moderately mapped as the students will be able to design solutions for SQL statements.
	PO8	3	Strongly mapped as the students will be able to apply principles to solve the solutions.
	PSO2	3	Strongly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	1	Slightly mapped as the students will be able to apply thinking appropriate to the engineering practices
	PO2	1	Slightly mapped as the students will be able to identify and analyze complex engineering problems.
	PO6	1	Slightly mapped as the students will be able to apply reasoning relevant to the engineering practices.
	PO7	2	Moderately mapped as the students will be able to demonstrate the knowledge of relational algebra.
	PO12	1	Slightly mapped as the students will be able to engage in lifelong learning of commands.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO5	PO9	1	Slightly mapped as the students will be able to function effectively to gather user requirements.

	based on various problems														
CO6	Analyze the performance of various algorithms to choose the optimum algorithm	3	3	3	3	3								3	3

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Students will be able to construct algorithms using basic design techniques for searching, sorting and graph algorithms which in turn will be used for the solution of complex engineering problems.
	PO2	3	Students will be able to use the basic design techniques of searching, sorting and graph algorithms for identifying and analyzing the complex engineering problem
	PO3	3	Students will be able to construct algorithms using basic design techniques for searching, sorting and graph algorithms for designing the solution for complex engineering problem
	PO4	3	Students will be able to construct algorithms using basic design techniques for searching, sorting and graph algorithms to find optimal algorithm for providing valid conclusions
	PO5	3	Students will be able to construct algorithms using basic design techniques for searching, sorting and graph algorithms in which they will be using the appropriate techniques and modern IT tools
	PSO1	3	Students will be able to construct algorithms using basic design techniques for searching, sorting and graph algorithms for designing software solutions to the real time problems.
CO2	PO1	2	Students will be able to design algorithms using advanced techniques for solving complex engineering problems
	PO2	2	Students will be able to design algorithms using advanced techniques for identifying and analyzing the complex engineering problem
	PO3	2	Students will be able to design algorithms using advanced techniques for designing the solution for

			complex engineering problem
	PO4	2	Students will be able to design algorithms using advanced techniques to find optimal algorithm for providing valid conclusions
	PO5	2	Students will be able to design algorithms using advanced techniques in which they will be using the appropriate techniques and modern IT tools
	PSO1	2	Students will be able to design algorithms using advanced techniques for designing software solutions to the real time problems.
	PSO2	2	Students will be able to design algorithms using advanced techniques in the field of computer science and engineering for understanding the problem and providing solution to it.
CO3	PO1	1	Students will be able to identify the given problem and formulate and design algorithm which in turn will be used for the solution of complex engineering problems.
	PO2	1	Students will be able to identify the given problem and formulate and design algorithm for identifying and analyzing the complex engineering problem
	PO3	1	Students will be able to identify the given problem and formulate and design algorithm for designing the solution for complex engineering problem
	PO4	1	Students will be able to identify the given problem and formulate and design algorithm to find optimal algorithm for providing valid conclusions
	PO5	3	Students will be able to identify the given problem and formulate and design algorithm in which they will be using the appropriate techniques and modern IT tools
	PSO1	1	Students will be able to identify the given problem and formulate and design algorithm for designing software solutions to the real time problems.
	PSO2	1	Students will be able to identify the given problem and formulate and design algorithm in the field of computer science and engineering for understanding the problem and providing solution to it.
CO4	PO1	3	Students will be able to use modern engineering tools and latest programming language which in turn will be used for the solution of complex engineering problems.
	PO2	3	Students will be able to use modern engineering tools and latest programming language for complex engineering problem
	PO3	3	Students will be able to use modern engineering tools

			and latest programming language for designing the solution for complex engineering problem
	PO4	3	Students will be able to use modern engineering tools and latest programming language for optimal algorithms for providing valid conclusions
	PO5	3	Students will be able to use the appropriate techniques and modern IT tools
	PSO1	3	Students will be able to use modern engineering tools and latest programming language for designing software solutions to the real time problems.
	PSO2	3	Students will be able to use modern engineering tools and latest programming language in the field of computer science and engineering for providing solution to it.
CO5	PO1	1	Students will be able to apply knowledge and function on multi-disciplinary teams which in turn will be used for the solution of complex engineering problems.
	PO2	1	Students will be able to apply knowledge for identifying and analyzing the complex engineering problem
	PO3	1	Students will be able to apply knowledge of various problems solved for designing the solution for complex engineering problem
	PO4	1	Students will be able to apply knowledge of various problems solved to find optimal algorithm for providing valid conclusions.
	PO5	3	Students will be able to use the appropriate techniques and modern IT tools for various problems to be solved.
	PSO1	1	Students will be able to use the knowledge of various problems solved for designing software solutions to the real time problems.
	PSO2	1	Students will be able to use the knowledge of various problems solved in the field of computer science and engineering for understanding the problem and providing solution to it.
CO6	PO1	3	Students will be able to analyze the performance of various algorithms to choose the optimum algorithm which in turn will be used for the solution of complex engineering problems.
	PO2	3	Students will be able to analyze the performance of various algorithms to choose the optimum algorithm for identifying and analyzing the complex engineering problem.
	PO3	3	Students will be able to analyze the performance of various algorithms to choose the optimum algorithm

			for designing the solution for complex engineering problem
	PO4	3	Students will be able to analyze the performance of various algorithms to choose the optimum algorithm to find optimal algorithm for providing valid conclusions
	PO5	3	Students will be able to analyze the performance of various algorithms to choose the optimum algorithm in which they will be using the appropriate techniques and modern IT tools
	PSO1	3	Students will be able to analyze the performance of various algorithms to choose the optimum algorithm for designing software solutions to the real time problems.
	PSO2	3	Students will be able to analyze the performance of various algorithms to choose the optimum algorithm in the field of computer science and engineering for understanding the problem and providing solution to it.

Course Name: Institutional Training

Course Code: TR-102

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Participate in the industrial projects in challenging environment of industry.	1		3											
CO2	Describe use of advanced tools and techniques encountered in industrial environment.			3		3		1	1				2	3	
CO3	Interact with professional and follow engineering practices and discipline required for real time projects.					3					2				2

CO4	Develop awareness about general workplace behaviour and build interpersonal and team skills.									3		2	3		3
CO5	Prepare project modules, professional work reports and presentations.			2		2					3		2		2
CO6	Design and develop software solutions as per requirements and satisfaction of clients.		1	3	2									2	

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	1	Slightly mapped as students will be able to find solution to complex engineering problems in challenging industrial environment
	PO3	3	Highly mapped as students will be able to design solutions and system components to meet the requirements of clients on societal problems.
CO2	PO3	3	Highly mapped as students will be able to use advance tools and techniques for solutions and system components to meet the requirements of clients on societal problems.
	PO5	3	Highly mapped as students will be able to apply techniques for system components to meet the requirements of clients on societal problems.
	PO7	1	Slightly mapped as students will be able to find solution to problems in the context of sustainable development goals and environmental issues.
	PO8	1	Slightly mapped as students will be able to commit professional ethics and norms required in industrial environment.
	PO12	2	Moderately mapped as the students will be prepared for lifelong learning to implement technological changes in industry projects.
	PSO1	3	Highly mapped as students will be able to gain practical knowledge for the solution of real world problems in industry environment.
CO3	PO5	3	Highly mapped as students will be able to meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations in industry environment.

	PO10	2	Moderately mapped as the students will be able to formulate, review research literature, and analyze complex engineering problems.
	PSO2	2	Moderately mapped as the students will have the ability to engage in independent and life-long learning in the broadest context of technological change with professional interaction.
CO4	PO9	3	Highly mapped as the students will be able to work in independent and diverse teams as a leader, in multidisciplinary settings for better interpersonal and team skills.
	PO11	2	Moderately mapped as the students will be able to demonstrate knowledge and understanding of the engineering and management principles for awareness of workplace behavior.
	PO12	3	Highly mapped as the students will have the ability to engage in independent and life-long learning in the broadest context of technological change.
	PSO2	3	Highly mapped as the students will have the ability to apply gained knowledge in the field of CSE with interpersonal and team skills.
CO5	PO3	2	Moderately mapped as the students will be able to prepare project reports, presentations for designed projects in industrial environment.
	PO5	2	Moderately mapped as the students will be able to use modern engineering and IT tools to prepare project reports, presentations for designed projects in industrial environment.
	PO10	3	Highly mapped as the students will be able to Communicate effectively on complex engineering activities with the engineering community and with society at large using project reports and presentations.
	PO12	2	Moderately mapped as the students will be able to engage in independent and life-long learning in the broadest context of technological change for project reports, presentations for designed projects in industrial environment.
	PSO2	2	Moderately mapped as the students will have the ability to apply the gained knowledge about work reports and presentation in the field of computer science & engineering.
CO6	PO2	1	Slightly mapped as students will be able to identify and formulate problems for solution to meet the client satisfaction and requirements.
	PO3	3	Moderately mapped as the students will be able to design solutions for complex engineering problems and design system components or processes as per client satisfaction in industrial environment.
	PO4	2	Moderately mapped as the students will have the ability to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data for client understanding and satisfaction.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time projects and industrial problems for better client satisfaction.

	programming to solve diverse problems related to computer graphics.													
CO2	Compare and contrast various computer graphic algorithms and their suitability to real world problems.	1	1										1	
CO3	Utilize models for transformation of 2d and 3d objects.					3								
CO4	Identify the areas of computer graphics to apply advance algorithmic techniques for changing the formations of geometrical objects.			1		1								
CO5	Apply mathematics and physics in the design and development of graphics applications.	2	2		2									
CO6	Justify the application of computer graphics concepts in the development of computer games, information visualization, and business applications.							2			2	2		2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Apply the concepts of mathematical foundations and programming to solve diverse engineering problems related to computer graphics.
	PO3	2	Design solutions for complex engineering problems and design system components or processes with the help of computer graphics.
	PO5	3	Modeling to complex engineering activities with graphics.
CO2	PO1	1	Apply the knowledge of computer graphic algorithms to the solution of complex engineering problems.
	PO2	1	Identify, compare and analyze complex graphics algorithms using first principles of mathematics, and engineering sciences.
	PSO1	1	Apply theoretical and practical knowledge of computer Graphics for developing software solutions to the real time problems
CO3	PO5	3	Utilize modeling to complex engineering activities with graphics objects.
CO4	PO3	1	Design solutions for complex engineering problems by applying advance computer graphics algorithmic techniques.
	PO5	1	Use research-based knowledge and research methods related to computer graphics to identify application areas.
CO5	PO1	2	Apply the knowledge of mathematics and physics in the design and development of graphics applications.
	PO2	2	Apply the knowledge of mathematics and physics to identify, formulate, and analyze complex engineering problems.
	PO4	2	Apply the knowledge of mathematics and physics in the design, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
CO6	PO7	2	Understand the impact of the professional computer graphics applications in societal and environmental contexts
	PO10	1	Communicate effectively on complex engineering activities by graphical models.
	PO11	2	Demonstrate knowledge and understanding of the computer graphics principles with suitable visualizations.
	PSO2	2	Apply and demonstrate the acquired knowledge of emerging trends and contemporary technologies in computer graphics context.

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be applying few mathematical techniques for machine learning problems.
	PO3	1	Slightly mapped as machine learning problems consider public health and safety.
	PSO1	2	Moderately mapped as students will learn to handle real world problems.
CO2	PO3	3	Strongly mapped as real-world problems consider public health and other environmental conditions.
	PO12	3	Highly mapped as students engage in life-long learning with respect to technological change.
	PSO1	3	Highly mapped as students will be working on machine learning projects involving real world problems.
CO3	PO1	3	Strongly mapped as mathematical concepts formulate the basis for various machine learning algorithms.
	PO4	2	Moderately mapped as students will perform experiments and interpret the results.
	PSO2	1	Slightly mapped as students will code to apply the acquired knowledge of machine learning algorithms for various computer science problems.
CO4	PO1	3	Strongly mapped as neural networks solve complex machine learning problems.
	PO2	1	Slightly mapped as machine learning concepts help identify, formulate and solve research-oriented problems.
	PSO2	2	Moderately mapped as machine learning knowledge will be applied to solve computer science problems.
CO5	PO1	3	Highly mapped as probability methods are used for solving machine learning problems.
	PO5	2	Moderately mapped as complex engineering problems are solved with understanding of limitations.
	PSO1	1	Slightly mapped as probability methods are used to solve real world problems.
CO6	PO3	1	Slightly mapped as engineering problems in machine learning involve societal and environmental conditions.
	PO4	2	Moderately mapped as genetic algorithms are designed, experimented, analyzed and interpreted.
	PSO2	1	Slightly mapped as genetic algorithms are used to solve various computer science problems.

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Analyze and illustrate the security policies, as well as protocols to implement security features.			3						3				3	
CO2	Analyze the network and system attacks, defences against them.								3		3				
CO3	Incorporate the approaches for risk management and needful practices.		2												
CO4	Classify the principles of web security.					1			1						
CO5	Determine computers networks and examine secure software practices.	3							3						3
CO6	Design key terms and concepts in cyber security, protect intellectual property and decrease cyber-crimes.			3									3		

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO3	3	Strongly mapped to apply security policies and propose solutions to real world problems
	PO9	3	Strongly mapped to real time problems in computer science field for cyber security

	of existing authentication protocols and key management techniques to provide security solutions													
CO2	Identify and analyze network security attacks and counter measures to prevent those attacks.		3	3	2								3	
CO3	Evaluate network security models using available solutions such as pgp, ssl, ipsec to provide robust framework for security threats.			3	3	2								
CO4	Assess impact of system and web security threats to ensure secure transmission of data.			3	3							2		
CO5	Analyze the security requirements and solutions for maintaining data integrity using modern techniques for data transmission.		2	2	3									3
CO6	Testing and verification of cryptography aspects by integrating people, processes and technologies.		3		2	3	3						2	

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to acquire the knowledge of existing authentication protocols and key management techniques in the field of engineering.
	PO2	3	Strongly mapped as the students will be able to apply the knowledge of existing authentication protocols and key management techniques to identify, formulate complex engineering problems.
	PO3	3	Strongly mapped as the students will be able to apply the knowledge of existing authentication protocols and key management techniques to design the solution for different engineering problems and environmental for societal considerations.
CO2	PO2	3	Strongly mapped, after acquiring the knowledge of network security attacks and its counter measure to prevent those attacks that will beneficial to identify, formulate, and analyze complex engineering problems.
	PO3	3	Strongly mapped, after acquiring the knowledge of network security attacks and its counter measure to prevent those attacks that will beneficial to design the solution for different engineering problems and environmental for societal considerations..
	PO4	2	Moderately mapped as the students will be able to find a feasible solution for the problem designed.
	PSO1	3	Strongly mapped, as the students will be able to implement the application software pertaining to the problem statement.
CO3	PO3	3	Strongly mapped as students will be able to evaluate network security models to find a solution for the problem identified for different engineering problems
	PO4	3	Strongly mapped as students will be able to evaluate network security models to provide robust framework for security threats for feasible solution for the problem designed.
	PO5	2	Moderately mapped as students will able to evaluate network security models to find the modern relevant tools to implement the problem stated.

CO4	PO3	3	Strongly mapped as the students will able to determine impact of system and web security threats to ensure secure transmission of data that meet the specified needs with appropriate considerations for environmental considerations.
	PO4	3	Strongly mapped as the students will able to determine impact of system and web security threats to investigations of complex problems for designing the feasible solution for the problem defined.
	PO12	2	Moderately mapped, impact of system and web security threats to ensure secure transmission of data will be beneficial for lifelong learning.
CO5	PO2	2	Moderately mapped as the students will be able to analyze the security requirements and solutions for maintaining data integrity using review of literature in the field of network security.
	PO3	2	Moderately mapped as the students will be able to analyze the security requirements and solutions for maintaining Data integrity for designing the solution for different engineering problems and environmental for societal considerations.
	PO4	3	Strongly mapped as the students will be able to analyze the security requirements and solutions for maintaining Data integrity for designing the solution for different engineering problems and environmental for societal considerations.
	PSO2	3	Strongly mapped, An overall understanding of design principles for connected devices and web connectivity concepts for providing IoT solutions in the field of computer science and engineering.
CO6	PO2	3	Strongly mapped, as students will able to testing and verification of cryptography aspects by integrating people, processes and technologies that will beneficial to identify, formulate, and analyze complex engineering problems.
	PO4	2	Moderately mapped, as students will able to testing and verification of cryptography aspects by integrating people, processes and technologies to interpret and draw conclusions related to network security .
	PO5	3	Strongly mapped, as students will able to design

			solutions using the modern relevant tools to implement the network security problems.
	PO6	3	Strongly mapped, as the students will be able to apply testing and verification of cryptography technologies for some societal needs.
	PSO1	2	Moderately mapped, Knowledge of design concepts related to testing and verification of cryptography that will help to for developing software solutions to the real time problems.

Course Name: Advance Database Management System

Course Code: PECS-114

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO1 1	PO1 2	PSO 1	PSO 2	
CO1	Implement pl/sql programming using concept of cursor management, error handling, package and triggers. (change from level-2 to level 3 or above)	2		1		3								1	2	2
CO2	Apply and relate the concept of transaction, concurrency control and recovery in database.	1					2							1	2	2
CO3	Recognize the purpose of query processing and optimization and also demonstrate the basic of query evaluation.	2	3							1		2		2	3	
CO4	Illustrate the concept of object oriented database and have experience with object	1		1										1		

	oriented modeling, design and implementation. (change from level-2 to level 3 or above)														
CO5	List the principles of distributed systems and describe the problems and challenges associated with these principles.		2			3							1	1	3
CO6	Evaluate the association rules for mining the data		1			1			1				2		2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained to find a feasible solution for the problems designed.
	PO3	1	Slightly mapped as the students will be able design solutions for database problems
	PO5	3	Strongly mapped as the students will be able to use PL/SQL programming tool.
	PO12	1	Slightly mapped as the students will be to use the gained knowledge lifelong.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO1	1	Slightly mapped as the students will be able to apply the DBMS concepts in database problems.
	PO6	2	Moderately mapped as the students will be able to apply the gained knowledge professional database problems.
	PO12	1	Slightly mapped as the students will be able to use the gained knowledge lifelong.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply

			the gained knowledge in the field of CSE.
CO3	PO1	2	Moderately mapped as the students will be able to apply the query optimization concepts in database problems.
	PO2	3	Strongly mapped as the students will be able to apply the knowledge of query optimization in database problems.
	PO9	1	Slightly mapped as the students will be able to work individually or in team for solving database problems.
	PO11	2	Moderately mapped as the students will be able to apply the query optimization concepts in database problems and in own work.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	3	Strongly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	1	Slightly mapped as the students will be able to apply the OODBMS concepts in database problems.
	PO3	1	Slightly mapped as the students will be able design solutions for OODBMS problems
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
CO5	PO2	2	Moderately mapped as the students will be able to apply the knowledge of DDBMS in database problems.
	PO5	3	Strongly mapped as the students will be able to use DDBMS techniques and concepts.
	PO12	1	Slightly mapped as the students will be able to use the gained knowledge lifelong.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	3	Strongly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO6	PO2	1	Slightly mapped as the students will be able to apply the knowledge of data mining in database problems.
	PO6	1	Slightly mapped as the students will be able to apply the gained knowledge professional database problems.
	PO9	1	Slightly mapped as the students will be able to work individually or in team for solving database and data mining problems.
	PO12	2	Moderately mapped as the students will be able to use the gained knowledge lifelong.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.

	semantics and pragmatics of English language for processing.														
CO6	Implement, and apply state-of-the-art techniques to novel problems involving natural language data.	3		2											3

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as students learn to apply mathematics and engineering knowledge in natural language processing.
	PSO1	3	Strongly mapped as students will be able to apply the concepts of natural language processing to develop software with respect to real time problems.
CO2	PO2	2	Moderately mapped as natural language processing models and algorithms will be used by students to conduct investigation of complex problems.
	PSO2	1	Slightly mapped as students will use this algorithmic knowledge in various aspects of computer science and engineering.
CO3	PO2	3	Highly mapped as the key concepts from natural language processing are applied in context with research-oriented problems.
	PO4	2	Moderately mapped as key concepts from natural language processing are used in investigation of complex problems, involving experimentation and analysis.
	PSO2	3	Highly mapped as students learn to apply and demonstrate the acquired knowledge of natural language processing in the problems involving computer science and engineering.
CO4	PO2	2	Moderately mapped as students understand the capabilities and limitations of natural language technologies, while applying them for complex engineering problems.
	PO6	1	Slightly mapped as students understand the capabilities and limitations of natural language technologies, considering responsibilities relevant to professional engineering practice.
	PSO1	1	Slightly mapped as students will learn to apply the concepts considering capabilities and limitations.

	and resolve them by applying the knowledge of exception handling.													
CO5	Design console based, GUI based and web based applications by implementing various concepts like event handling, applets and database connectivity.			3						3		3		3
CO6	Utilize the concept of networking to develop systems for establishing communication between client and server.			3						3				

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped to apply techniques and propose solutions to real world problems
	PSO1	3	Strongly mapped to apply object oriented programming concepts in computer science field for projects
CO2	PO2	2	Moderately mapped to apply and analyze the concept of classes
CO3	PO3	1	Slightly mapped to formulate complex engineering problems
CO4	PO5	1	Slightly mapped to examine errors and apply exception handling techniques
CO5	PO3	3	Strongly mapped to design GUI and console based applications
	PO10	3	Strongly mapped to communicate effectively within engineering applications
	PO12	3	Strongly mapped to recognize the need for lifelong learning in the context of technology development.
	PSO2	3	Strongly mapped to apply acquired knowledge in computer science field

problems in the domain of computer graphics.															
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Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Apply mathematics and logic to develop computer programs for elementary graphic operations towards the solution of complex engineering problems.
	PO3	2	Identify, formulate and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics and logic.
	PSO1	2	Apply theoretical and practical knowledge of computer graphics for developing software solutions to the real time problems.
CO2	PO3	1	Apply the knowledge of mathematics and logic to implement solution of complex engineering problems.
	PSO1	1	Apply theoretical and practical knowledge of computer graphics to implement software solutions to the real time problems.
CO3	PO2	2	Identify and analyze complex engineering problems reaching substantiated conclusions using computer graphics concepts
	PO4	1	Implement scan conversion problems with use of research-based knowledge and research methods available in computer graphics.
CO4	PO1	1	Apply the knowledge of clipping and filling to solve complex engineering problems.
	PO3	2	Design system components or processes using clipping and filling concepts
	PO5	2	Create, select, and apply appropriate clipping techniques and tools including prediction and modeling to complex engineering activities.
CO5	PO3	1	Gain experience in designing interactive graphics applications using one or more graphics application programming interfaces.
	PO5	2	Gain experience in design of experiments to provide valid solutions.
	PSO1	1	To apply theoretical and practical knowledge of interactive graphics applications to model real time problems.
	PSO2	2	To apply and demonstrate the acquired knowledge of interactive graphics applications in the field of computer science and engineering

algorithms for optimization of engineering solutions															
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Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO2	2	Moderately mapped as students will identify, analyze and solve engineering problems on the basis of machine learning.
	PO3	3	Highly mapped as students will design and develop solutions for complex engineering problems using machine learning, analyzing the specific conditions involved.
	PSO1	2	Moderately mapped as will implement machine learning algorithms for developing software solutions to real time problems.
CO2	PO1	1	Slightly mapped as students will apply the knowledge of mathematics and engineering fundamentals in designing and developing various machine learning algorithms.
	PO3	3	Highly mapped as students will be using real time data, to design and develop various algorithms for specific problems.
	PSO1	3	Highly mapped as students will be using real world datasets, to solve problems using machine learning algorithms.
CO3	PO2	1	Slightly mapped as students will identify, analyze and solve domain specific machine learning problems.
	PO4	2	Moderately mapped as complex domain specific problems can be experimented, analyzed and interpreted using machine learning techniques.
	PSO2	1	Slightly mapped as students will be able to apply and demonstrate the acquired knowledge of machine learning techniques in field of computer science and engineering.
CO4	PO3	3	Highly mapped as students will design and develop solutions of real time problems with prediction and visualization.
	PO5	3	Highly mapped as modern machine learning tools and techniques will be used to develop solutions of real time problems.
	PSO1	3	Highly mapped as students will be using machine learning concepts involving real world datasets, to develop solutions of real time problems with prediction and visualization.
CO5	PO4	1	Slightly mapped as genetic algorithms are experimented and analyzed for optimization of engineering solutions.
	PSO1	1	Slightly mapped as students will apply the genetic algorithms for developing software solutions to the real time problems.
CO6	PO1	1	Slightly mapped as students will apply the knowledge of

			mathematics and engineering fundamentals in designing and developing genetic algorithms.
	PSO1	1	Slightly mapped as students will apply the genetic algorithms for developing software solutions to the real time problems.

Course Name: Software Testing and Quality Assurance Laboratory Course Code: LPECS-101

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Ability to conduct formal inspections, record and evaluate results of inspections.				3										
CO2	Adapt to various test processes, types of errors and fault models and methods of test generation from requirements for continuous quality improvement of the software system along with Software Quality best practices usage.		3											3	
CO3	Apply software testing cycle in relation to software development and project management focusing incidents.			2								2			
CO4	Apply risks management within a project towards efficient delivery of software solutions.											2			

CO5	Implement improvements in the software development processes by making use of standards and baselines					2										2
CO6	Test the software by applying testing techniques to deliver a product free from bugs.	1													1	

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO3	3	Design solution is development of dynamic web applications.
CO2	PO2	3	Problem is analyzed to choose and apply appropriate testing technique.
	PSO1	3	It is related to providing testing software solutions.
CO3	PO3	2	Testing solution is designed.
	PO11	2	Project management – software testing cycle is generated.
CO4	PO11	2	Project management – Risk management is applied.
CO5	PO5	2	Testing tools are explored and applied to maintain standards and baselines.
	PSO2	2	Modern technologies are used to deliver quality product.
CO6	PO1	1	Testing technique is applied.
	PSO1	1	Knowledge of testing is applied in real-time applications.

Course Name: Network Security and Cryptography Laboratory Course Code: LPECS-104

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Implement encryption			3									3		

	and decryption techniques for providing security solutions.													
CO2	Analyze the impact of public key cryptosystems for secure exchange of information.			3				3					3	
CO3	Analyze and design network security protocols for information exchange over unsecure network				2					2				
CO4	Apply security principles for implementing authentication applications.		1					1			3			
CO5	Analyze the security requirements and solutions for maintaining data integrity using modern techniques for data transmission.			3										
CO6	Testing and verification of cryptography aspects by integrating people, processes and technologies.	3												3

Justification of Mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
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CO1	PO3	3	Strongly mapped as the students will be able to analyzed design solution of engineering problems using knowledge of encryption and decryption techniques for providing security solutions.
	PO12	3	Strongly mapped because knowledge of encrypting and decrypting methods for security solutions will be beneficial for lifelong in the broadest context of technological change.
CO2	PO3	3	Strongly mapped, after acquiring the knowledge of public key crypto system for securing exchange of information that will helpful to design solutions for environmental for societal considerations.
	PO8	3	Strongly mapped, after acquiring the knowledge of public key crypto system that will aware the professional ethics and responsibilities while securing the exchange of information.
	PSO1	3	Strongly mapped, as the students will be able to implement the solution designing application for securing exchange of information.
CO3	PO4	2	Moderately mapped as students will be able to design and analyze network security protocols to investigate the complex engineering problems.
	PO10	2	Moderately mapped, after understanding the network security protocols for information exchange over unsecure network that will encourage the students to express the documentations/ report writing of engineering solutions.
CO4	PO2	1	Slightly mapped, as the students will be able to analyze the security requirements and solutions for maintaining data integrity using review of literature in the field of network security.
	PO8	1	Slightly mapped as the students will aware the professional ethics and responsibilities while applying security principles for implementing authentication applications.
	PO11	3	Strongly mapped, In applying engineering knowledge, awareness of the role of a leader, manager and team member helps students function in a context in an appropriate manner.

CO5	PO3	3	Strongly mapped as the students will be able to analyze the security requirements and solutions for maintaining data integrity using review of literature in the field of network security.
CO6	PO1	3	Strongly mapped, as students will be able to testing and verification of cryptography aspects by integrating people, processes and technologies that will beneficial to identify, formulate, and analyze complex engineering problems.
	PSO2	3	Strongly mapped, Knowledge of design concepts related to testing and verification of cryptography that will help to for developing software solutions to the real time problems.

Course Name: Advance Database Management System Lab.

Course Code: LPECS-

107

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Implement pl/sql programming using concept of cursor management, error handling, package and triggers. (change from level-2 to level 3 or above)	2	2	2	2	2						1		2	2
CO2	Apply and relate the concept of transaction, concurrency control and recovery in database.	2	2	1	2	2								1	1
CO3	Recognize the purpose of query processing and optimization and also demonstrate the basic of query	1	2		2	1						1		2	1

	evaluation.														
CO4	Illustrate the concept of object oriented database and have experience with object oriented modeling, design and implementation. (change from level-2 to level 3 or above)	1	2	2	2	2						2		2	1
CO5	List the principles of distributed systems and describe the problems and challenges associated with these principles.	1	2		1	1								2	
CO6	Evaluate the association rules for mining the data.	1	1		1	2								2	

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained to find a feasible solution for the problems designed.
	PO2	2	Moderately mapped as the students will be able to apply the knowledge gained to better manage PL/SQL concepts.
	PO3	2	Moderately mapped as the students will be able design solutions for database problems
	PO4	2	Slightly mapped as students will be able to handle database issues in Projects.
	PO5	2	Moderately mapped as the students will be able to use PL/SQL programming tool.
	PO11	2	Slightly mapped as students will be able to handle Package and Triggers.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.

	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO1	2	Moderately mapped as the students will be able to apply the DBMS concepts in database problems.
	PO2	2	Moderately mapped as the students will be able to apply the gained knowledge for better handling Transactional Data.
	PO3	1	Slightly mapped as the students will be able design solutions for database problems.
	PO4	2	Moderately mapped as students will be able to handle database issues in Projects.
	PO5	2	Moderately mapped as the students will be able to use DBMS techniques and concepts.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO1	1	Slightly mapped as the students will be able to apply the query optimization concepts in database problems.
	PO2	2	Moderately mapped as the students will be able to apply the knowledge of query optimization in database problems.
	PO4	2	Moderately mapped as students will be able to handle database issues in Projects.
	PO5	1	Slightly mapped as the students will be able to use query optimization techniques.
	PO11	1	Slightly mapped as students will be able to handle Query optimization.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	1	Slightly mapped as the students will be able to apply the query optimization concepts in database problems.
	PO2	2	Moderately mapped as the students will be able to apply the knowledge of query optimization in database problems.
	PO3	2	Moderately mapped as the students will be able design solutions for database problems
	PO4	2	Moderately mapped as students will be able to handle database issues in Projects.
	PO5	2	Moderately mapped as the students will be able to use object-oriented modeling concepts.
	PO11	2	Moderately mapped as students will be able to handle Object modeling.
	PSO1	2	Moderately mapped as the students will be able to apply

			the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO5	PO1	1	Slightly mapped as the students will be able to apply the query optimization concepts in database problems.
	PO2	2	Moderately mapped as the students will be able to apply the knowledge of query optimization in database problems.
	PO4	1	Slightly mapped as students will be able to handle database issues in Projects.
	PO5	1	Slightly mapped as the students will be able to handle Distributed systems.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO6	PO1	1	Slightly mapped as the students will be able to apply the query optimization concepts in database problems.
	PO3	1	Slightly mapped as the students will be able design solutions for database problems
	PO4	1	Slightly mapped as students will be able to handle database miming issues.
	PO5	2	Moderately mapped as the students will be able to use data mining concepts.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.

Course Name: Natural Language Processing Laboratory

Course Code: LPECS-110

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Apply the knowledge of engineering to understand the computational properties of natural languages and to implement the algorithms for processing linguistic information.	2		2					2			1		2	
CO2	Utilize the models and methods of statistical				3	2		1		2			2		2

	natural language processing for common NLP tasks such as speech recognition, machine translation, text classification, spell checking etc.														
CO3	Understand the key concepts of morphology, syntactic analysis for implementing pos tagging algorithms and context free grammar for English language.		2		3					2				1	3
CO4	Identify and apply natural language processing algorithms to solve real world problems		2				2				2	1			
CO5	Understanding semantics and pragmatics of English language for processing.							1				2		2	
CO6	Implement, and apply state-of-the-art techniques to novel problems involving natural language data.	1				2									2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to Apply the knowledge of engineering to understand the

			computational properties of natural languages
	PO3	2	Moderately mapped as the students will be able to design and implement solutions.
	PO8	2	Moderately mapped as the students will be able to apply and analyze strategies.
	PO11	1	Slightly mapped as the students will be able to design and analyze problems
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO4	3	Strongly mapped as the students will be able to utilize the models and methods of statistical natural language processing for common NLP tasks.
	PO5	2	Moderately mapped as the students will be able to apply appropriate techniques for tool usage.
	PO7	1	Slightly mapped as the students will be able to Formulate valid solutions for problems.
	PO9	2	Moderately mapped as the students will be able to demonstrate and enrich knowledge to select and apply tools.
	PO12	2	Moderately mapped as the students will be able to understand and manage the engineering practice.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO2	2	Moderately mapped as the students will be able to Understand the key concepts.
	PO4	3	Strongly mapped as the students will be able to utilize the models and methods of statistical natural language processing for common NLP tasks.
	PO9	2	Moderately mapped as the students will be able to demonstrate and enrich knowledge to select and apply tools.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	3	Strongly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO2	2	Moderately mapped as the students will be able to Identify and apply natural language processing algorithms to solve real world problems.
	PO6	2	Moderately mapped as the students will be able to apply reasoning related questions.
	PO10	2	Moderately mapped as the students will be able to effectively communicate.
	PO11	1	Slightly mapped as the students will be able to design and analyze problems.
CO5	PO7	1	Slightly mapped as the students will be able to Formulate valid solutions for problems.

	make the system bug free.													
CO5	Apply the knowledge of event handling, applets, networking features and database connectivity to develop business oriented web based solution.			2				2					2	
CO6	Design Java programs to design a system to meet industrial needs and to solve real world problems based on client-server communication.				2			2	2			2		2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped to apply the knowledge of java syntax and execute java programs
CO2	PO3	3	Strongly mapped to apply classes, objects, constructors and inheritance
	PO5	3	Strongly mapped to apply object oriented concepts and tools
CO3	PO4	3	Strongly mapped to create applets and event handling programs using GUI development
CO4	PO5	1	Slightly mapped to implement exception handling techniques
CO5	PO3	2	Moderately mapped to apply networking and database connectivity features
	PO8	2	Moderately mapped to apply ethics and responsibilities
	PSO1	2	Moderately mapped to develop business oriented web based solutions
CO6	PO5	2	Moderately mapped to solve real world problems based on client server communication
	PO9	2	Moderately mapped to work as a team and in multidisciplinary settings
	PO10	2	Moderately mapped to communicate effectively within engineering applications

	PO12	2	Moderately mapped to recognize the need for lifelong learning in the context of technology development.
	PSO2	2	Moderately mapped to apply acquired knowledge in computer science field

Course Name: Minor Project

Course Code: PRCS-102

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Apply engineering, ethical and mathematical principles to achieve objectives of a project.	3							3					3	
CO2	Analyze, formulate and review the literature and develop solutions for framed problem statement.		3	3											
CO3	Design and construct hardware and/or software system, component, or process to meet desired needs.			3		3							3	3	
CO4	Choose and apply emerging trends and contemporary project management methodologies in context of computer science and engineering.											3			3
CO5	Test and validate various modules of planned project.				2	2									
CO6	Demonstrate the ability to work,									1	1				

communicate effectively as a team and to write and present technical reports.																		
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Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Knowledge of mathematical proofs, techniques and algorithms to achieve project objectives.
	PO8	3	Apply ethical principles and commit to professional ethics and responsibilities while executing project work.
	PSO1	3	Apply theoretical and practical knowledge gained for developing software solutions to the real time problems.
CO2	PO2	3	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions.
	PO3	3	Design solutions for complex engineering problems and design system components or processes that meet the specified objectives.
CO3	PO3	3	Design projects for complex engineering problems and design system components or processes that meet the specified objectives.
	PO5	3	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools to meet project objectives.
	PO12	3	Ability to engage in independent and life-long learning in the broadest context of technological change.
	PSO1	3	Apply theoretical and practical knowledge gained by developing major projects to the real time problems.
CO4	PO11	3	Demonstrate knowledge and understanding of the engineering and project management principles and apply these to project work, as a member and leader in a project team, to manage projects and in multidisciplinary environments.
	PSO2	3	To apply and demonstrate the acquired knowledge of emerging trends and contemporary technologies via project implementations in the field of computer science and engineering.

CO5	PO4	2	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions through research-based projects.
	PO5	2	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools to test and validate project modules.
CO6	PO9	1	Function effectively as an individual, and as a member or leader in diverse project teams, and in multidisciplinary settings.
	PO10	1	To communicate effectively and write effective reports and design documentation, make effective presentations to support the project work.

Course Name: Agile Software Development

Course Code: PECS-103

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Interpret the concept of agile software engineering and its advantages in software development.	2		2			3			2				3	2
CO2	Analyze the core practices behind several specific agile methodologies.		2	3	1				1				2	3	
CO3	Identify the roles and responsibilities in agile projects and their difference from projects following traditional methodologies.		2			3				1			2		2

CO4	Access implications of functional testing, unit testing, and continuous integration.	3				2	2	1		1				2	
CO5	Determine the role of design principles in agile software design.	2		3			2				2	2			2
CO6	Make use of various tools available to agile teams to facilitate the project.				2			2	2		1	1		2	

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained to find a feasible solution for the problems designed.
	PO3	2	Moderately mapped as the students will be able design solutions for Software Engineering problems.
	PO6	3	Strongly mapped as the students will be able to use his/her knowledge to develop various tools for society.
	PO9	2	Moderately mapped as the students will be able to use the gained knowledge to work in a team.
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO2	2	Moderately mapped as the students will be able to apply methodologies of Agile in various core practices.
	PO3	3	Strongly mapped as the students will be able to apply the gained knowledge professionally to design and develop solutions for various real time problems.
	PO4	1	Slightly mapped as the students will be able to investigate various complex problems.
	PO8	1	Slightly mapped as the students will be able to ethical principles in

			solving real time problems.
	PO12	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
CO3	PO2	2	Moderately mapped as the students will be able to apply his knowledge to analyze and formulate problems.
	PO5	3	Strongly mapped as the students will be able to apply various tools and techniques to solve engineering problems.
	PO9	1	Slightly mapped as the students will be able to work individually or in team for solving agile problems.
	PO12	2	Moderately mapped as the students will be able to recognize the needs and prepare for lifelong learning.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO4	PO1	3	Strongly mapped as the students will be able to apply the agile testing approach for testing software engineering problems.
	PO5	2	Moderately mapped as the students will be able use various tools for testing of agile software engineering problems.
	PO6	2	Moderately mapped as the students will be able to serve society with their knowledge of agile software testing.
	PO7	1	Slightly mapped as the students will be able to test various real time problems.
	PO9	1	Slightly mapped as the students will be able to test various real time problems individually and in a team.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO5	PO1	2	Moderately mapped as the students will be able to apply the design engineering principles to various problems.
	PO3	3	Strongly mapped as the students will be able to design various techniques and concepts to solve real time problems.
	PO6	2	Moderately mapped as the students will be able to use the gained design knowledge for serving the society.
	PO10	2	Moderately mapped as the students will be able to apply various design principles through communication in agile software engineering.
	PO11	2	Moderately mapped as the student will be able to use his design knowledge in project management and development.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO6	PO4	2	Moderately mapped as the students will be able to conduct investigation of various tools for solving real time problems.
	PO7	2	Moderately mapped as the students will be able to apply the gained knowledge of various tools to fulfill the requirements of Client.
	PO8	2	Moderately mapped as the students will be able to use various tools to work ethically.
	PO10	1	Slightly mapped as the students will be able to use the gained

			knowledge in communicating with end users.
	PO11	1	Slightly mapped as the students will be able to use the knowledge to manage funds for project designing.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.

Course Name: Object Oriented Analysis and Design Using UML Course Code: PECS-104

CO#	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Identify and apply various software diagrams, to determine the quality level of software.	2	3		1		2					1	1	3	2
CO2	Effective Quality control and reliability of quality process and Quality management system Models		2		3		2	1					1	3	2
CO3	Identify the quality level of internal and external attributes of the software product to be designed.		1	3	2		2							3	2
CO4	Work with various methods, metrics and strategies for Testing software projects.		1		3	2	2				2	1	1	3	3

CO5	Design various diagrams considered as reliability models for evaluating the quality level of the software based on the requirement.	1		2			2		1		1			2	1
CO6	Evaluate a design for applicability and relation to other design criteria.		1	3		1							1	1	1

Justification of Mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained to find a feasible solution for the problems designed.
	PO2	3	Strongly mapped as the students will be able determine the quality of software.
	PO4	1	Slightly mapped as the students will be able to use various diagrams to provide valid conclusions.
	PO6	2	Moderately mapped as the students will be to use the gained knowledge in professional engineering practice.
	PO11	1	Slightly mapped as the students will be able to apply the various diagrams learned in own work.
	PO12	1	Slightly mapped as the students will be able to use the gained knowledge lifelong.

	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO2	2	Moderately mapped as the students will be able to perform effective quality control in quality management systems.
	PO4	3	Strongly mapped as the students will be able to use quality control to provide valid conclusions.
	PO6	2	Moderately mapped as the students will be to use the gained knowledge in professional engineering practice.
	PO7	1	Slightly mapped as the students will be to understand and demonstrate the gained knowledge in professional engineering practice.
	PO12	1	Slightly mapped as the students will be able to use the gained knowledge lifelong.
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO2	1	Slightly mapped as the students will be able to analyze the software product to be designed.
	PO3	3	Strongly mapped as the students will be able to apply the knowledge to design software products.
	PO4	2	Moderately mapped as the students will be able to use design principles to provide valid conclusions.
	PO6	2	Moderately mapped as the students will be to use the gained knowledge in professional engineering practice.
	PSO1	3	Strongly mapped as the students will be able to apply

			the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO2	1	Slightly mapped as the students will be able to analyze various strategies to test software.
	PO4	3	Strongly mapped as the students will be able to use various test strategies to provide valid conclusions.
	PO5	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PO6	2	Strongly mapped as the students will be able to use testing tools, techniques and strategies.
	PO10	2	Moderately mapped as the students will be able to communicate the solutions easily.
	PO11	1	Slightly mapped as the students will be able to apply the testing tools, techniques and strategies in own work.
	PO12	1	Slightly mapped as the students will be able to use the gained knowledge lifelong.
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	3	Strongly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO5	PO1	1	Slightly mapped as the students will be able to evaluate the quality level of software.
	PO3	2	Moderately mapped as the students will be able to apply the knowledge to design software products according to requirements.
	PO6	2	Moderately mapped as the students will be able to use reliability models for quality evaluation of software.
	PO8	1	Slightly mapped as the students will be able to make ethical use of reliability models for quality evaluation

			of software.
	PO10	1	Slightly mapped as the students will be able to communicate the solutions easily.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO6	PO2	1	Slightly mapped as the students will be able to analyze the applicability of learned concepts.
	PO3	3	Strongly mapped as the students will be able to apply the knowledge to design software products.
	PO5	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
	PO12	1	Slightly mapped as the students will be able to use the gained knowledge lifelong.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.

Course Name: Object Oriented Analysis and Design Using UML Laboratory

Course Code: LPECS-102

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P1 1	P1 2	PSO 1	PSO 2
CO1	Identify various metrics and models to Access software		3	2		3		2					1	2	

CO2	Identify the suitable project organization structure, leadership, decision and motivation styles, safety and ethical practices and be responsible to the society.			3		1	3		1			1	1	2	3
CO3	Identify the usage of various activity scheduling tools.	2	2			3		2				1	1	2	3
CO4	Understand the phases of software projects and practice the activities of each phase.	2	2		3	1				1		1	1	2	2
CO5	Apply schedule and cost control techniques for project monitoring including contract management.	3	2		2	1					1		1	3	2
CO6	Perform Analysis and Design activities using Object oriented modelling techniques.	2	2	3		2						1		2	3

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO2	3	Strongly mapped as the students will be able to apply the knowledge gained to find a feasible solution for the problems designed.
	PO3	2	Moderately mapped as the students will be able to analyze various metrics and models to Access software.
	PO5	3	Strongly mapped as the students will be able to use Access software.
	PO7	2	Moderately mapped as the students will be to use the gained knowledge in professional engineering practice.

	PO12	1	Slightly mapped as the students will be able to use the gained knowledge lifelong.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO3	3	Strongly mapped as the students will be able to perform effective project organization and decision making.
	PO5	1	Slightly mapped as the students will be able to perform effective project organization and decision making
	PO6	3	Strongly mapped as the students will be to use the gained knowledge in professional engineering practice.
	PO8	1	Slightly mapped as the students will be to understand and demonstrate the gained knowledge in professional engineering practice.
	PO11	1	Slightly mapped as the students will be able to apply the concepts learned in own work.
	PO12	1	Slightly mapped as the students will be able to use the gained knowledge lifelong.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	3	Strongly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO1	2	Moderately mapped as the students will be able to apply the gained knowledge in activity scheduling.
	PO2	2	Moderately mapped as the students will be able to analyze various activity scheduling tools.
	PO5	3	Strongly mapped as the students will be able to use scheduling tools to provide valid conclusions.
	PO7	2	Moderately mapped as the students will be to use the gained knowledge in professional engineering practice.
	PO11	1	Slightly mapped as the students will be able to apply the concepts learned in own work.
	PO12	1	Slightly mapped as the students will be able to use the gained knowledge lifelong.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	3	Strongly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	2	Moderately mapped as the students will be able to understand various project phases.
	PO2	2	Moderately mapped as the students will be able to analyze each phase activities.
	PO4	3	Strongly mapped as the students will be able to

			practice each phase activities to provide valid conclusions
	PO5	1	Slightly mapped as the students will be able to practice each phase activities.
	PO9	1	Slightly mapped as the students will be able to communicate the solutions easily.
	PO12	1	Slightly mapped as the students will be able to use the gained knowledge lifelong.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO5	PO1	3	Strongly mapped as the students will be able to apply schedule and cost control techniques effectively in project management.
	PO2	2	Moderately mapped as the students will be able to analyze schedule and cost control techniques effectively in project management..
	PO4	2	Moderately mapped as the students will be able to apply the knowledge for schedule and cost control in project management.
	PO5	1	Slightly mapped as the students will be able to apply schedule and cost control techniques effectively in project management.
	PO10	1	Slightly mapped as the students will be able to make ethical use of schedule and cost control techniques effectively in project management.
	PO12	1	Slightly mapped as the students will be able to use the gained knowledge lifelong.
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO6	PO1	2	Moderately mapped as the students will be able to apply Object oriented modeling techniques.
	PO2	2	Moderately mapped as the students will be able to analyze Object oriented modeling techniques.
	PO3	3	Strongly mapped as the students will be able design activities using Object oriented modeling techniques.
	PO5	2	Moderately mapped as the students will be able to apply Object oriented modeling techniques.
	PO11	1	Slightly mapped as the students will be able to apply the concepts learned in own work.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	3	Strongly mapped as the students will be able to apply

			the gained knowledge in the field of CSE.
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Course Name: Software Defined Networks

Course Code: PECS-109

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Learn the concepts of software defined networks and differentiate from traditional networks.	2		2										2	1
CO2	Examine the SDN architecture and operation of SDN.		1		3	1							1		2
CO3	Learn SDN interface between networking devices and the software controlling them.	1			1						3			1	2
CO4	Describe Network Functions Virtualization components and their roles in SDN.		2			3					1		1	3	
CO5	Understand Open Flow specifications and key benefits of SDN by the separation of data, control planes and application plane.	1		2		2									2
CO6	Examine the needs of SDN data center and various technologies and use cases in SDN.	1		3	1							2		3	2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to apply the knowledge for differentiating software defined networks from traditional networks.
	PO3	2	Moderately mapped as the students will be able to design and develop solutions.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO2	1	Slightly mapped as the students will be able to identify the architectural constraints.
	PO4	3	Strongly mapped as the students will be able to design and analyze data.
	PO5	1	Slightly mapped as the students will be able to select tools for application of techniques.
	PO12	1	Slightly mapped as the students will be able to recognize the architectural limitations.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO1	1	Slightly mapped as the students will be able to apply knowledge for creating SDN interface.
	PO4	1	Slightly mapped as the students will be able to design and analyze data.
	PO10	3	Strongly mapped as the students will be able to effectively communicate.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO2	2	Moderately mapped as the students will be able to identify network function Virtualization components.
	PO5	3	Strongly mapped as the students will be able to select tools for application of techniques.
	PO10	1	Slightly mapped as the students will be able to effectively communicate.
	PO12	1	Slightly mapped as the students will be able to engage in life-long learning.
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
CO5	PO1	1	Slightly mapped as the students will be able to recognize specific areas of development.
	PO3	2	Moderately mapped as the students will be able to

			design and develop solutions.
	PO5	2	Moderately mapped as the students will be able able to select tools for application of techniques.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO6	PO1	1	Slightly mapped as the students will be able to identify and recognize the needs for data Centre.
	PO3	3	Strongly mapped as the students will be able to design and develop solutions.
	PO4	1	Slightly mapped as the students will be able to design and analyze data.
	PO11	2	Moderately mapped as the students will be able to demonstrate different work areas.
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.

Course Name: Wireless Sensor Networks

Course Code: PECS-110

CO#	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Know the basics of Ad hoc networks and Wireless Sensor Networks.	3	3					2							
CO2	Study the various protocols at various layers and its differences with traditional protocols	1	3												
CO3	Identify the issues pertaining to sensor networks and the challenges involved in managing		2	3	3								2		

	sensor networks.													
CO4	Understand the fundamentals of wireless sensor networks and its application to critical real time scenarios.		2	3	3								2	
CO5	Design and apply suitable routing algorithm based on the network and user requirement.		2	3	3	3								3
CO6	Apply the knowledge to identify appropriate physical and MAC layer protocols.		2	3	1									2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as the students will be able to understand basics of Ad hoc networks and Wireless Sensor Networks in engineering problems.
	PO2	3	Strongly mapped, after studying the basics of Ad hoc networks and Wireless Sensor Networks the students will be able to identify the techniques and algorithms

			in the field of WSN.
	PO7	2	Moderately mapped as the students will be able to finds professional engineering solutions for environmental safety.
CO2	PO1	1	Slightly mapped as the students will be able to apply knowledge in WSN fundamentals using study of various protocols at various layers.
	PO2	3	Strongly mapped, After studying the various protocols for WSN and other traditional networks, students will able to identify and formulate the engineering problems in the field of WSN.
CO3	PO2	2	Moderately mapped, as students will able to identify the issues pertaining to sensor networks and the challenges involved in managing sensor networks
	PO3	3	Strongly mapped , The solutions for various engineering problems in WSN requires knowledge design issues and challenges in WSNs.
	PO4	3	Strongly mapped , as solutions for various real time WSN engineering problems requires knowledge design issues and challenges in WSNs.
	PO12	2	Moderately mapped because students will learn about the WSN vision in terms of design constraints and challenges of real time applications i.e. health monitoring, agricultural monitoring etc. that are beneficial for lifelong learning.
CO4	PO2	2	Moderately mapped, After understanding the fundamentals of WSNs and its application to critical real time scenarios, students will able to identify and formulate the engineering problems.
	PO3	3	Strongly mapped, as the students will be able to analyzed design solution of WSN engineering problems.
	PO4	3	Strongly mapped, as the students will be able to students will be able to design the solution for different engineering problems and environmental for societal considerations.
	PO12	2	Moderately mapped because knowledge pertaining to fundamentals of WSNs and its application to critical real time scenarios, facilitate lifelong learning.

CO1	Know the basics of ad hoc networks and wireless sensor networks.	3	3											
CO2	Study the various protocols at various layers and its differences with traditional protocols.		2	3		2						3	3	
CO3	Identify the issues pertaining to sensor networks and the challenges involved in managing sensor networks.		3	3		3	2							
CO4	Understand the fundamentals of wireless sensor networks and its application to critical real time scenarios.		2	3		3						2		
CO5	Design and apply suitable routing algorithm based on the network and user requirement.		2	3										
CO6	Apply the knowledge to identify appropriate physical and mac layer protocols.	1	2											

Justification of Mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as the students will be able to understand basics of Ad hoc networks and Wireless

			Sensor Networks in engineering problems.
	PO2	3	Strongly mapped, after studying the basics of Ad hoc networks and Wireless Sensor Networks the students will be able to identify the techniques and algorithms in the field of WSN.
CO2	PO2	3	Strongly mapped, After studying merits and demerits of various WSN tools, students will able to identify and formulate the engineering problems in the field of WSN.
	PO3	3	Strongly mapped, knowledge of various WSN tools students will be able to analysis WSN problem and design issues and challenges in the field of WSNs.
	PO5	2	Moderately mapped as the students will be able to find the relevant tools to implement the problem stated.
	PO12	3	Strongly mapped because students will learn about the WSN vision in terms of design constraints and challenges of real time applications
	PSO1	3	Strongly mapped as the students will be able to implement the software solution (routing algorithm) pertaining to the problem designed.
CO3	PO2	3	Strongly mapped, as students will able to design identify the issues pertaining to sensor networks and the challenges involved in managing sensor networks
	PO3	3	Strongly mapped , The solutions for various engineering problems in WSN requires knowledge design issues and challenges in WSNs.
	PO5	3	Strongly mapped , as solutions for various real time WSN engineering problems requires knowledge design issues and challenges in WSNs.
CO4	PO2	2	Moderately mapped, After understanding the fundamentals of WSNs and its application to critical real time scenarios, students will able to identify and formulate the engineering problems.
	PO3	3	Strongly mapped, as the students will be able to analyzed design solution of WSN engineering problems.
	PO5	3	Strongly mapped, as the students will be able to students will be able to design the solution for different engineering problems and environmental for

			societal considerations.
	PO12	2	Moderately mapped because students will learn about the WSN vision in terms of design constraints and challenges of real time applications like health monitoring, agricultural monitoring etc. those are beneficial for lifelong learning.
CO5	PO2	2	Moderately mapped as the students will be able to develop design methodologies for the WSN system applying the suitable routing algorithm based on the network and user requirement.
	PO3	3	Strongly mapped as the students will be able to develop design methodologies for the WSN system applying the suitable routing algorithm based on the network and user requirement
	PSO2	2	Moderately mapped, An overall understanding of performance parameters of routing protocols for providing WSN solutions in the field of computer science and engineering
CO6	PO1	3	Strongly mapped as the students will be able to understand basics of Ad hoc networks and Wireless Sensor Networks in engineering problems.
	PO2	2	Moderately mapped as the students will be able to analysis problem in the sight of design solution of complex engineering problems.

Course Name: Data Warehousing and Data Mining

Course Code: PECS-115

CO#	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	Analyze the evolutionary path that has led to the purpose of adapting to Data Warehouse and Data Mining techniques in various domains		2	3			1			1			2	3	
CO2	Identify the need of	2			3				1					2	1

	Data Warehouse tools and techniques.													
CO3	Evaluate different Data Mining techniques to gather and analyze large sets of data to gain useful business understanding		3			1				2	1		3	
CO4	Describe basic Data Mining algorithms, methods and tools	2	2		3				2			2		
CO5	Compare different approaches of Data Warehousing and Data Mining with various technologies	1			3	2		2				2	2	
CO6	Examine prescribed case studies and identify the patterns of developing areas of Data Mining	1		2			2			1				2

Justification of Mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO2	2	Moderately mapped as the students will be able to identify and formulate complex problems related to data warehousing.
	PO3	3	Strongly mapped as the students will be able to design and develop solutions.
	PO6	1	Slightly mapped as the students will be able to apply reasoning for the data mining techniques.
	PO9	1	Slightly mapped as the students will be able to function effectively in teams.
	PO12	2	Moderately mapped as the students will be able to

			engage in life-long learning.
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO1	2	Moderately mapped as the students will be able to apply the knowledge of engineering fundamentals to get a feasible solution.
	PO4	3	Strongly mapped as the students will be able to design and analyze data.
	PO8	1	Slightly mapped as the students will be able to apply principles of engineering.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO3	3	Strongly mapped as the students will be able to design and develop solutions.
	PO7	1	Slightly mapped as the students will be able to demonstrate the knowledge of techniques.
	PO11	2	Moderately mapped as the students will be able to demonstrate the knowledge and understand the techniques of data mining.
	PO12	1	Slightly mapped as the students will be able to engage in life-long learning.
	PSO2	3	Strongly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	2	Moderately mapped as the students will be able to apply knowledge of basic fundamentals.
	PO3	2	Moderately mapped as the students will be able to design and develop solutions.
	PO5	3	Strongly mapped as the students will be able to select tools for application of techniques.
	PO10	2	Moderately mapped as the students will be able to effectively communicate.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO5	PO1	1	Slightly mapped as the students will be able to apply knowledge of basic fundamentals.
	PO4	3	Strongly mapped as the students will be able to design and analyze data.
	PO5	2	Moderately mapped as the students will be able to select tools for application of techniques.
	PO8	2	Moderately mapped as the students will be able to apply techniques and principles to get to a feasible method.
	PO12	2	Moderately mapped as the students will be able to engage in life-long learning.

CO4	Access the various issues and challenges in context of cloud security.		3			1									
CO5	Compare and contrast open cloud platforms with commercial cloud platforms.	3													2
CO6	Plan a cloud using open cloud platform.			1		1									

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the student will be able to compare different computing paradigms.
	PO3	1	Slightly mapped as the student will be able to generate a solution after comparison.
	PSO2	1	Slightly mapped as the student will be able to use the knowledge of computing paradigms in the field of computer science and engineering.
CO2	PO1	3	Strongly mapped as the student will be use core technologies of cloud computing in generating a solution.
	PO3	2	Moderately mapped as the student will be able to select a particular deployment model.
	PSO2	2	Moderately mapped as the student will be able to use the knowledge of cloud deployment models.
CO3	PO3	2	Moderately mapped as the student will be able to select a cloud service model as a solution.
CO4	PO2	3	Strongly mapped as the student will be able to analyze the challenges in context with cloud security.

CO6	Examine the architecture and services offered by different cloud platforms.		2		2													2
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Justification of Mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	1	Slightly mapped as the students will be able to apply the knowledge of engineering to solve the complex cloud related problems.
	PO5	3	Highly mapped as students will be able to use CloudSim Toolkit to simulate cloud computing environment.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems .
CO2	PO1	2	Moderately mapped as the students will be able to apply the knowledge of engineering to solve the complex cloud related problems.
	PO5	3	Highly mapped as the students will be able to use CloudAnalyst Simulation Toolkit to simulate cloud computing environment.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO2	1	Slightly mapped as the students will be able to analyze various problems using different cloud simulation tools
	PO5	2	Moderately mapped as the students will be able to use various cloud computing simulation tools.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
CO4	PO2	1	Slightly mapped as the students will be able to identify problems that can solved through Cloud computing applications.
	PO4	1	Slightly mapped as the students will be able to investigate performance of various Cloud computing applications.
CO5	PO3	1	Slightly mapped as the students will be able to develop scheduling policy in cloud simulation tools.
	PO5	1	Slightly mapped as the students will be able to use simulation tools for developing the solution.

	representation.													
CO4	Access which methods to use for solving a given problem, and analyze the accuracy of the methods.	3			3								3	3
CO5	Design Computer Vision system for a specific problem.			2									2	2
CO6	Construct the geometric relationships between 2D images and the 3D world.	2			2									2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO2	3	Student will be able to identify the various models of computer vision for identifying and analyzing the complex engineering problem
	PSO1	3	Student will be able to identify the various theories and models of computer vision for designing software solutions to the real time problems
	PSO2	3	Student will be able to identify the various models of computer vision in the field of computer science and engineering for understanding
CO2	PO1	2	Student will be able to analyze the different methods of computer vision related to multi-scale representation, edge detection and detection of other primitives which in turn will be used for the solution of complex engineering problems.
	PO2	2	Student will be able to analyze the different methods of computer vision related to multi-scale representation, edge detection and detection of other

			primitives for identifying and analyzing the complex engineering problem
	PO3	2	Student will be able to design the solution for complex engineering problem by analyzing the different methods of computer vision related to multi-scale representation, edge detection and detection of other primitives
	PSO1	2	Student will be able to analyze the different methods of computer vision related to multi-scale representation, edge detection and detection of other primitives for designing software solutions to the real time problems
	PSO2	2	Student will be able to analyze the different methods of computer vision related to multi-scale representation, edge detection and detection of other primitives in the field of computer science and engineering for understanding
CO3	PO1	3	Student will be able to use and apply appropriate image processing methods for image filtering , image restoration, image reconstruction, segmentation which in turn will be used for the solution of complex engineering problems.
	PO2	3	Student will be able to use and apply appropriate image processing methods for image filtering , image restoration, image reconstruction, segmentation for identifying and analyzing the complex engineering problem
	PO3	3	Student will be able to use and apply appropriate image processing methods for image filtering , image restoration, image reconstruction, segmentation, classification and representation for designing the solution for complex engineering problem
	PSO1	3	Student will be able to use and apply appropriate image processing methods for image filtering , image restoration, image reconstruction, segmentation, classification and representation for designing software solutions to the real time problems
	PSO2	3	Student will be able to use and apply appropriate image processing methods for image filtering , image restoration, image reconstruction, segmentation, classification and representation in the field of computer science and engineering for understanding
CO4	PO1	3	Students will be able to access which methods to use for solving a given problem, analyze the accuracy of the methods which in turn will be used for the solution of complex engineering problems.

CO2	Implement the concept of genetic algorithms to develop various genetic applications.	1	2	3	1	1								1	
CO3	Describe the operational benefits of neural network architectures and Fuzzy logic.	2	2		3									2	1
CO4	Identify and Apply a suitable Soft Computing technology to solve the problem.	1	3	2	2	1								1	
CO5	Construct optimized solution for various Fuzzy Systems.		2	2	1			1						1	1
CO6	Demonstrate and Apply various optimization techniques to solve a real world problem.	1	2	2	1	1								1	

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained of various soft computing

			techniques.
	PO2	1	Slightly mapped as the students will be able to identify and analyze the complex engineering problems to provide valid conclusions in soft computing techniques.
	PO3	2	Moderately mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems related to behavioral aspects of soft computing methods.
	PO4	2	Moderately mapped as the students will be able to use and analyze design principles to provide valid conclusions in soft computing methods.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained of various genetic applications.
	PO2	2	Moderately mapped as the students will be able to identify and analyze the complex engineering problems to provide valid conclusions in genetic algorithm.
	PO3	3	Strongly mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems related to implementation of genetic algorithm.
	PO4	1	Slightly mapped as the students will be able to use design principles to provide valid conclusions in development of genetic algorithm.
	PO5	1	Slightly mapped as the students will be able to use and apply modern engineering tool to describe neural network and fuzzy logic concepts.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
CO3	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained of neural networks architectures and fuzzy logic.
	PO2	2	Moderately mapped as the students will be able to identify and analyze the complex engineering problems to provide valid conclusions in neural network and fuzzy logic concepts.
	PO4	3	Strongly mapped as the students will be able to use design principles to provide valid conclusions in operational benefits of neural networks.
	PSO1	2	Moderately mapped as the students will be able to

			apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained to suitable soft computing technology.
	PO2	3	Strongly mapped as the students will be able to identify and analyze the complex engineering problems to provide valid conclusions in soft computing.
	PO3	2	Moderately mapped as the students will be able to identify and apply the knowledge to design solutions to complex engineering problems related to suitable soft computing concept.
	PO4	2	Moderately mapped as the students will be able to identify and use design principles to provide valid conclusions in soft computing.
	PO5	1	Slightly mapped as the students will be able to use and apply modern engineering tool to describe soft computing technology.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
	CO5	PO2	2
PO3		2	Moderately mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems related to fuzzy systems.
PO4		1	Slightly mapped as the students will be able to use design principles to provide valid conclusions in construction of fuzzy system.
PO7		1	Slightly mapped as the students will be to understand and demonstrate the gained knowledge in professional engineering practice of fuzzy systems.
PSO1		1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
PSO2		1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO6	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained of various optimization methods.
	PO2	2	Moderately mapped as the students will be able to identify and analyze the complex engineering problems to provide valid conclusions in real world problem using optimization concepts.

	problem.														
CO5	Develop projects using soft computing tools and techniques.		2	3		1						1	1	1	
CO6	Construct optimized solution for various Fuzzy Systems	1	2	2	1									2	

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained in designing of soft computing methods.
	PO2	2	Moderately mapped as the students will be able to identify and analyze the complex engineering problems to provide valid conclusions in implementation of soft computing methods.
	PO3	3	Strongly mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems related to efficient soft computing method.
	PO4	2	Moderately mapped as the students will be able to use design principles to provide valid conclusions in building of soft computing techniques.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.

CO2	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained in genetic algorithm.
	PO3	2	Moderately mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems related to genetic algorithm applications.
	PO4	1	Slightly mapped as the students will be able to use design principles to provide valid conclusions in utilization of genetic algorithm.
	PO5	1	Slightly mapped as the students will be able to use and apply modern engineering tool to describe application areas of genetic algorithm.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained in fuzzy and neural networks.
	PO3	2	Moderately mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems related to fuzzy and neural networks.
	PO4	2	Moderately mapped as the students will be able to use design principles to provide valid conclusions.
	PO6	1	Slightly mapped as the students will be to use the gained knowledge in professional engineering practices.
	PO7	1	Slightly mapped as the students will be to understand and demonstrate the gained knowledge in professional engineering practice of fuzzy and neural systems.
	PSO1	2	Moderately mapped as the students will be able to

			apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained in soft computing technology.
	PO2	3	Strongly mapped as the students will be able to identify and analyze the complex engineering problems to provide valid conclusions in soft computing techniques.
	PO3	2	Moderately mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems.
	PO4	1	Slightly mapped as the students will be able to use design principles to provide valid conclusions in soft computing technology.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
	CO5	PO2	2
PO3		3	Strongly mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems related to optimization under soft computing.
PO5		1	Slightly mapped as the students will be able to use and apply modern engineering tool to describe soft computing optimized techniques.
PO11		1	Slightly mapped as the students will be able to apply the gained knowledge to understand the engineering practices to provide valid conclusion in

			multidisciplinary environment.
	PO12	1	Slightly mapped as the students will be able to apply the gained knowledge in life-long learning in context to development of soft computing tools and techniques.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
CO6	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained in construction of fuzzy systems.
	PO2	2	Moderately mapped as the students will be able to identify and analyze the complex engineering problems to provide valid conclusions in fuzzy systems.
	PO3	2	Moderately mapped as the students will be able to apply the knowledge to design solutions to complex engineering problems related to optimization techniques.
	PO4	1	Slightly mapped as the students will be able to use design principles to provide valid conclusions in optimization techniques.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.

Course Name: Advanced Algorithm Design and Analysis

Course Code: PECS-127

CO	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Compare and analyze different design techniques with an intent of their limitations		1		1	1							2	1	

computer science theory to the modeling and design of computer based systems in a way that demonstrates comprehension of the trade-offs involved in design choices.															
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Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO2	1	Slightly mapped as the students will be able to find suitable design techniques to find a feasible solution for the problems designed.
	PO4	1	Slightly mapped as the students will be able to analyze the solutions derived using different design techniques.
	PO5	1	Slightly mapped as the students will be able to implement different design techniques .
	PO12	2	Moderately mapped as the students will be able to use the gained knowledge lifelong.
	PSO1	1	Slightly mapped as the students will be able to find suitable design techniques for solving a real time problems.
CO2	PO2	1	Slightly mapped as the students will be able to find design design techniques to solve complex engineering problems.
	PO3	3	Strongly mapped as the students will be able to design solution for complex engineering problems using advance algorithms design techniques.
	PO4	2	Moderately mapped as the students will be able to select optimal solution for complex engineering problems using advance algorithms design techniques.
	PO5	2	Moderately mapped as the students will be able to implement complex engineering problems by following various different design techniques

	PSO1	3	Strongly mapped as the students will be able to design solution for real time problems using advance algorithms design techniques.
CO3	PO2	2	Moderately mapped as the students will be able to formulate the objective statement of complex engineering problems required to apply different algorithm design techniques.
	PO4	2	Moderately mapped as the students will be able to analyze various solution of complex engineering problems using different algorithm design techniques.
CO4	PO2	2	Moderately mapped as the students will be able to formulate the objective statement of complex engineering problems required to apply and identify suitable algorithm design techniques.
	PO3	3	Strongly mapped as the students will be able to design and analyze solution for complex engineering problems using advance algorithms design techniques.
	PO4	2	Moderately mapped as the students will be able to analyze solutions derived using different algorithms design techniques of complex engineering problems.
	PSO1	3	Strongly mapped as the students will be able to find suitable design techniques for solving a real time problems.
CO5	PO3	3	Strongly mapped as the students will be able to design solution for complex engineering problems in the framework of parallel computing to reduce time complexity.
	PO4	2	Moderately mapped as the students will be able to select optimal solution for complex engineering problems in the framework of parallel computing to reduce time complexity.
	PO5	2	Moderately mapped as the students will be able to implement complex engineering problems in the framework of parallel computing to reduce time complexity.
	PSO1	2	Moderately mapped as the students will be able to design solution for real time problems using advance algorithms design techniques.
CO6	PO2	1	Slightly mapped as the students will be able to select design techniques to solve complex engineering problems considering trade-offs involved in design choices.
	PO4	2	Moderately mapped as the students will be able to

			select design techniques to solve complex engineering problems considering trade-offs involved in design choices.
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Course Name: Web Technologies

Course Code: PECS-128

CO	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Apply the knowledge of web technology stack to deploy various web services.	2												1	
CO2	Analyze and evaluate web technology components for formulating web related problems		3												
CO3	Design and develop website using HTML, CSS, JavaScript and PHP			1			1								
CO4	Implement the concept of Session and Cookies for Login System			1											
CO5	Apply advance concepts of web APIs to build web projects in multidisciplinary environments.									2					2
CO6	Implement the concept for creating content based dynamic web applications.			3					3						

	elements and attributes.														
CO3	Build dynamic web pages using MVC Environment				3										
CO4	Create Responsive Website Design by using the Twitter Bootstrap			1										1	
CO5	Understanding of server side scripting with PHP language	3													
CO6	Develop and deploy real time web applications on web servers			1											1

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO3	3	Design and development of web pages.
	PSO1	3	Design solution for real time web pages is developed.
CO2	PO2	2	Problem is analyzed and web page is designed accordingly.
CO3	PO5	3	Tools are used for development of user interface
CO4	PO3	1	Responsive websites are designed and developed.
	PSO1	1	Responsive websites are designed and developed – software solution.

4	different types of questions based on Core areas of Computer Science and Engineering.														
CO 5	To speak fluently and confidently to demonstrate various techniques during presentations.										3				
CO 6	To demonstrate corporate readiness in terms of attitude, communication, team work and emotional balance								2	3					

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to assess societal, health, safety , legal and cultural issues relevant to professional engineering practice.
	PO2	2	Strongly mapped as the students will be able understand ethical principles and norms of engineering practice.
	PO3	2	Slightly mapped as the students will be to use the gained knowledge lifelong.
	PSO1	3	Strongly mapped as the students will be able to apply practical knowledge of computer science to provide solution to real time problems.
CO2	PO4	3	Moderately mapped as the students will be able to

	engineering knowledge.														
CO3	Attain new skills and be aware of the state-of-art in engineering disciplines of their own interest.					2		1		1	1				2
CO4	Learn modern tools and contemporary ideas by practicing self-learning.					3								1	
CO5	Learn work ethics by interacting with engineers and other professional groups thereby, increasing technical, interpersonal and communication skills.								1		3	1		1	1
CO6	Writing technical reports, demonstrate and presenting their projects.										2				2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to apply basic skills about project development, organization and implementation to provide solution for a problem.
	PO2	1	Slightly mapped as the students will be able identify

			and analyze complex engineering problems.
	PO3	3	Strongly mapped as the students will be able to apply the knowledge to design software products.
	PO4	1	Slightly mapped as the students will be able to use basic skills about project development, organization and implementation to provide valid conclusions.
	PO5	1	Slightly mapped as the students will be able to use learned techniques and tools to solve complex engineering problems.
	PO6	2	Moderately mapped as the students will be to use the gained knowledge in professional engineering practice.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO2	1	Slightly mapped as the students will be able identify and analyze complex engineering problems.
	PO5	1	Slightly mapped as the students will be able to use learned techniques and tools to solve complex engineering problems.
	PO6	2	Moderately mapped as the students will be to use the gained knowledge in professional engineering practice.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
CO3	PO5	2	Moderately mapped as the students will be able to apply new skills and be aware of the state-of-art in engineering to provide solution for a problem.
	PO7	1	Slightly mapped as the students will be able understand the impact of state-of-art in engineering in professional engineering solutions.
	PO9	2	Moderately mapped as the students will be able to work individually and in teams as well.
	PO10	1	Slightly mapped as the students will be to communicate the gained knowledge.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO4	PO5	3	Strongly mapped as the students will be able to use learned techniques and tools to solve complex engineering problems.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
CO5	PO8	1	Slightly mapped as the students will be able to learn work ethics by interacting with engineers and other professional groups
	PO10	3	Strongly mapped as the students will be to communicate their work.

	PO11	1	Slightly mapped as the students will be able to demonstrate learned skills in their own work.
	PSO1	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO6	PO10	2	Moderately mapped as the students will be to communicate and demonstrate their work through reports and presentations.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.

Course Name: Industrial Training

Course Code: TR-104

CO	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Improve their ability to solve problems utilizing the tools and available industrial environment.				2	3								2	
C02	Understand the professional responsibility, duty and ethics of an engineer.						2		3	3					2
CO3	Get familiar with real-world working conditions and procedures, to develop professionalism and team-work capabilities.			2								3	2		2

CO4	Learn the fundamentals of project creation, feasibility analysis, and implementation in order to create a cost-effective solution for interdisciplinary domains.	1	3						2		3		3	
CO5	Understand the many difficulties encountered in the actual world and the important issues calling for more research considering the societal needs.				3		1	3				2		2
CO6	Develop engineering communication skills, such as those for technical writing and speaking up in the workplace.									3				3

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO4	2	Moderately mapped as students shall be able to conduct investigations to solve complex problem.
	PO5	3	Highly mapped as students shall be able to utilize modern IT tools available in the industrial environment to solve complex problems.
	PSO1	2	Moderately mapped as students shall be able to apply theoretical and practical concepts to design solutions
CO2	PO6	2	Moderately mapped as students shall be able to

			understand the responsibilities of an engineer working in the industry.
	PO8	3	Highly mapped as shall learn the ethics of working in industry.
	PO9	2	Highly mapped as students shall learn to work in team-work and understand professionalism.
CO3	PO3	2	Moderately mapped as students shall be able to design solutions for real-world problems to meet specified needs.
	PO11	3	Highly mapped as students shall learn to manage the software projects using various concepts learnt while working in teams.
	PSO2	2	Moderately mapped as students shall apply the acquired knowledge learnt to manage the projects effectively using modern tools to deliver the same on time.
CO4	PO1	1	Slightly mapped as students shall apply the knowledge of software engineering concepts to conduct feasibility analysis before project creation
	PO2	3	Highly mapped as students could effectively conduct the problem analysis while working in various interdisciplinary domains.
	PO9	2	Moderately mapped as students could work in team and learn interdisciplinary working environments.
	PO11	3	Highly mapped as students could engage themselves to acquire more knowledge in a life-long manner and have the capability to work in interdisciplinary domains.
	PSO1	3	Highly mapped as students shall be able to apply theoretical and practical concepts to design solutions for interdisciplinary domains.
CO5	PO4	3	Highly mapped as students could conduct effective research on available literature to design a software solution considering societal needs.
	PO6	2	Moderately mapped as students could demonstrate the acquired knowledge as per the societal constraints to the project team for effective solutions.
	PO7	3	Highly mapped as students could understand the practical implications of the working environment for which they are asked to design the software solutions.
	PSO2	3	Highly mapped as the students can apply the emerging trends of CSE to develop research-based solutions to solve societal problems.
CO6	PO10	3	Highly mapped as students could demonstrate the progress done to a project group and communicate effectively to propose optimal solution.
	PSO2	3	Highly mapped as the students can apply the emerging trends of CSE to develop optimal solutions and present the same to the outer world in the form of written reports

CO5	Design new metrics and reliability models for evaluating the quality level of the software based on the requirement.			3											
CO6	Control and manage the project and processes, apply configuration management on the basis of collected metrics.										3	3	3		

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO2	3	Strongly mapped to identify various software metrics
CO2	PO5	1	Slightly mapped to access quality control and reliability
	PSO1	1	Slightly mapped to demonstrate in Computer science field for developing software solutions
CO3	PO2	3	Strongly mapped to identify quality level of attributes
CO4	PO5	3	Strongly mapped for testing software products
	PSO2	3	Strongly mapped to apply in Computer Science field with contemporary technologies
CO5	PO3	3	Strongly mapped to design and evaluate quality level of software based on requirements
CO6	PO11	3	Strongly mapped to manage projects in multidisciplinary environments
	PO12	3	Strongly mapped to recognize the need for life long learning in technology change.
	PSO1	3	Strongly mapped to apply practical knowledge for software solutions

Course Name: Component Based Development

Course Code: PECS-107

CO	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	To Familiarize with Component Based Systems, their Purpose and Scope		2												2
CO2	Analyze Software Engineering Practices related to CBD				1										1
CO3	Apply design Of Software Component Infrastructures	2													2
CO4	Identify Component Based Development Technologies		2		2									2	
CO5	Deal with Fundamental properties of components, technology and architecture and middleware				3										2
CO6	Relate the concept of Legal and regulatory framework related to Component Based Development			1										1	

Justification of mapping:

CO Number	PO/PSO Number	Correlati on Level (1/2/3)	Justification of mapping
CO1	PO1	2	Moderately mapped as the students will be able to identify various problems and their scope using Component Based Systems
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO4	1	Slightly mapped as the students will be able to investigate software engineering practices using CBD.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO1	2	Moderately mapped as the students will be able to apply the knowledge of Software Component Infrastructure.
	PSO2	2	Moderately mapped as the students will be able to apply the gained

CO5	Deal with Fundamental properties of components, technology and architecture and middleware.	2	2	1	2	2						1		2	
CO6	Relate the concept of Legal and Regulatory framework related to Component Based Development.	1				2	2	1	1					2	

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as the students will be able to apply the knowledge gained to familiarize with component-based systems.
	PO2	1	Slightly mapped as the students will be able to identify and analyze the purpose and scope of component-based systems.
	PO3	1	Slightly mapped as the students will be able to design solutions to component-based systems.
	PO5	2	Moderately mapped as the students will be able to use and apply appropriate technique for component-based systems.
	PO7	2	Moderately mapped as the students will be able to understand and demonstrate the gained knowledge in professional engineering practice.
	PSO1	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO1	2	Moderately mapped as the students will be able to apply and analyze the knowledge gained to software engineering practices related to component-based systems.
	PO2	2	Moderately mapped as the students will be able to identify and analyze software engineering practices of

			component-based systems.
	PO5	2	Moderately mapped as the students will be able to use and analyze software engineering practices.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained to design software components infrastructures.
	PO3	2	Moderately mapped as the students will be able to design and apply solutions to software infrastructures.
	PO4	1	Slightly mapped as the students will be able to use and apply design of software component to provide valid conclusions.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained to identify component-based development techniques.
	PO2	3	Strongly mapped as the students will be able to identify and analyze the technologies used in component-based systems.
	PO4	1	Slightly mapped as the students will be able to use and apply component-based development technologies to provide valid conclusions.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO5	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained to deal with fundamental properties of component-based systems.
	PO2	2	Moderately mapped as the students will be able to identify and analyze the fundamental properties of components of architecture and middleware.
	PO3	1	Slightly mapped as the students will be able to design solutions for the fundamental properties of components of architecture and middleware.
	PO4	2	Moderately mapped as the students will be able to use and apply research-based knowledge to provide valid conclusions.
	PO5	2	Moderately mapped as the students will be able to

			use and apply fundamental properties of component-based systems.
	PO11	1	Slightly mapped as the students will be able to apply the gained knowledge to understand the engineering practices for components-based systems
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO6	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained to relate the concept of legal and regulatory framework with component-based systems.
	PO5	2	Moderately mapped as the students will be able to use and apply legal and regulatory framework of component-based systems.
	PO6	2	Moderately mapped as the students will be to use the gained knowledge in professional engineering practice.
	PO7	1	Slightly mapped as the students will be to understand and demonstrate the gained knowledge in professional engineering practice.
	PO8	1	Slightly mapped as the students will be able to make ethical use of legal and regulatory framework of component-based systems.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.

Course Name: Blockchain Technology

Course Code: PECS-113

CO	Statements	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO 1	Elaborate the emerging concept of Blockchain Technology as a foundation for future.	1		2								2			2
CO 2	Outline the secure		2						1						

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	1	Apply the knowledge of blockchain fundamentals to explore the solution of complex problems.
	PO3	2	Design solutions of complex problems using the distributed architecture and features including security and integrity offered by blockchain.
	PO11	2	Recognize the need for blockchain technology and ability to engage in independent and life-long learning in the broadest context of technological change.
	PSO2	2	Apply and demonstrate the acquired knowledge of blockchain technologies in the field of computer science and engineering.
CO2	PO2	2	Facilitates to assess societal, safety, and legal issues and the consequent responsibilities relevant to the professional engineering practice.
	PO8	1	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice in context of crypto currencies in particular.
CO3	PO3	1	Discuss various consensus algorithms used in blockchain system Design consensus protocols or processes that meet the specified needs of blockchain applications.
	PO12	1	Recognize the need to have an efficient consensus protocol in the broadest context of future needs of technological change.
	PSO2	1	Apply and demonstrate the acquired knowledge of consensus protocols in the field of blockchain.
CO4	PO1	1	Apply the knowledge of networking and smart contracts to the solution of complex engineering problems.
	PO2	1	Identify, formulate and analyze blockchain challenges and reaching substantiated conclusions using principles of Ethereum and smart contracts.
	PO3	2	Design platforms with Ethereum and smart contracts that meet the specified needs of blockchain applications.
CO5	PO3	1	Design solutions for complex engineering problems using hyperledger fabric.
	PO4	2	Design of experiments, analysis and interpretation of data, and synthesis of the information using Fabric.
CO6	PO2	1	Review research literature, and analyze complex engineering problems related to blockchain
	PO4	1	Use research-based knowledge and research methods to

			identify the research areas in blockchain.
	PO12	3	Recognize the need to analyze research areas in blockchain to engage in life-long learning.
	PSO1	1	Apply theoretical and practical knowledge of blockchain technology to solve real time problems.
	PSO2	2	To apply and demonstrate the acquired knowledge of emerging trends in blockchain to understand its impact and utilization.

Course Name: Internet of Things

Course Code: PECS-112

CO	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand general concepts of internet of things (iot).	3					1						2		
CO2	Discriminate the functionality of ip and mac addresses along-with the application layer protocols.		3	2											
CO3	Illustration of the design principles for connected devices and web connectivity.			3		3									2
CO4	Analyze various m2m and iot architectures.		3		2										
CO5	Apply design concepts to iot solutions.			3		3							2	3	

CO6	Create iot solutions using sensors, actuators, and devices.		3	3		3							2	3	
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Justification of Mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as the students will be able to understand significance of IoT in engineering problems.
	PO6	1	Slightly mapped as the students will be able to apply Internet of Things knowledge for some societal needs.
	PO12	2	Moderately mapped because students will learn about the Internet of Things (IoT) vision and real-world IoT examples that are beneficial for lifelong learning.
CO2	PO2	3	Strongly mapped because students will learn about IoT reference model, M2M architecture and application layer protocols using research literature related to IoT.
	PO3	2	Moderately mapped as the students will be able to analyzed design solution of engineering problems using M2M architecture and functionality of Internet of Things (IoT) protocols.
CO3	PO3	3	Strongly, because after studying the design principles of connected devices and web connectivity, students will be able to design the solution for different engineering problems and environmental for societal considerations.
	PO5	3	Strongly mapped as the students will be able to apply appropriate techniques, resources, and modern engineering and IT tools using IoT design principles.
	PSO2	2	Moderately mapped, An overall understanding of design principles for connected devices and web connectivity concepts for providing IoT solutions in the field of computer science and engineering.
CO4	PO2	3	After understanding M2M architecture and IoT architecture for different domains, students are able to

			identify, formulate, and analyze complex engineering problems.
	PO4	2	Moderately mapped, students will able to design and analyze investigate the complex problems using understanding of architectures of M2M and IoT architectures.
CO5	PO3	3	Strongly mapped as students can design solutions for complex engineering problems and design system components or processes using IoT design solutions.
	PO5	3	Strongly mapped as students can design solutions for complex engineering problems and design system components or processes using modern tools for IoT.
	PO12	2	Moderately mapped because knowledge of design concepts of IoT will be beneficial for lifelong in the broadest context of technological change.
	PSO1	3	Strongly, Knowledge of design concepts to IoT solutions will help to for developing software solutions to the real time problems.
CO6	PO2	3	Strongly, Identification, review of literature and analyze complex engineering problems will be helpful to creating IoT solutions.
	PO3	3	Strongly mapped as students can design solutions for complex engineering problems and design system components or processes using IoT design solutions.
	PO5	3	Strongly mapped as students can design solutions using sensors, actuators and devices for complex engineering problems and design system components or processes using modern tools for IoT.
	PO12	2	Moderately mapped because knowledge of design concepts of IoT will be beneficial for lifelong in the broadest context of technological change.
	PSO1	3	Strongly, Knowledge of design concepts to IoT solutions will help to for developing software solutions to the real time problems.

Course Name: Internet of Things laboratory

Course Code: LPECS-106

CO	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand	3					1						2		

	internet of things along-with its hardware and software components.													
CO2	Interface i/o devices, sensors & communication modules.		3	3								1		
CO3	Use wireless peripherals for exchange of data.			3		3						2		
CO4	Understand the key features of ad hoc and sensor networks		2											
CO5	Analyze and evaluate protocols used in iot and data received through sensors in iot.		3	2								2		3
CO6	Develop real-time iot based automation systems.		3	3		3					2	2	3	

Justification of Mapping

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as the students will be able to understand hardware and software components of IoT.
	PO6	1	Slightly mapped as the students will be able to apply Internet of Things knowledge for some societal, health and safety needs.
	PO12	2	Moderately mapped because students will learn about the Internet of Things (IoT) vision and real-world IoT examples that are beneficial for lifelong learning.

CO2	PO2	3	Strongly mapped because students will learn about interfacing I/O devices, sensors and communication modules to identify and formulate engineering problems.
	PO3	3	Strongly mapped as the students will be able to analyzed design solution of engineering problems using knowledge of interfacing I/O devices, sensors and communication modules.
	PO12	1	Slightly mapped because knowledge of interfacing I/O devices, sensors and communication modules will be beneficial for lifelong in the broadest context of technological change.
CO3	PO3	3	Strongly, because after studying the wireless peripherals for exchange of data, students will be able to design the solution for different engineering problems and environmental for societal considerations.
	PO5	3	Strongly mapped as the students will be able to apply appropriate techniques, resources, and modern engineering and IT tools using IoT design principles.
	PO12	2	Slightly mapped because knowledge of wireless peripherals for exchange of data will be beneficial for lifelong in the broadest context of technological change.
CO4	PO2	2	Moderately, After understanding ad-hoc and sensor networks, students are able to identify, formulate, and analyze complex engineering problems.
CO5	PO2	3	Strongly, After understanding protocols used in IoT, students are able to identify, formulate, and analyze complex engineering problems.
	PO3	2	Moderately mapped as students can design solutions for complex engineering problems and design system components or processes using IoT design solutions.
	PO12	2	Moderately mapped because knowledge of protocols used in IoT will be beneficial for lifelong in the broadest context of technological change.
	PSO2	3	Strongly, Knowledge of protocols used in IoT will help to for developing software solutions to the real time problems.
CO6	PO2	3	Strongly, Identification, review of literature and

			analyze complex engineering problems will be helpful to creating IoT solutions.
	PO3	3	Strongly mapped as students can design solutions for complex engineering problems and design system components or processes using IoT design solutions.
	PO5	3	Strongly mapped as students can design solutions using sensors, actuators and devices for complex engineering problems and design system components or processes using modern tools for IoT.
	PO11	2	Moderately , In applying engineering knowledge, awareness of the role of a leader, manager and team member helps students function in a context in an appropriate manner.
	PO12	2	Moderately mapped because knowledge of design concepts of IoT will be beneficial for lifelong in the broadest context of technological change.
	PSO1	3	Strongly, Knowledge of design concepts to IoT solutions will help to for developing software solutions to the real time problems.

Course Name: Big Data

Course Code: PECS-118

CO	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Explain the structural concepts and analytics tools of big data related with business problems.	2	2	2	1	2	2							2	
CO2	Apply Hadoop and MapReduce commands in big data distributed environment of Clusters.	2	3	2	2	2		1						2	1

CO3	Evaluate Hadoop distributed file system with Mapper and Reducer for big data management.	2	2	2	2	3		1				1		2	1
CO4	Discuss and compare different types of databases for big data application management.	1	1		2	2						1		2	
CO5	Classify business analytics and analytical methods in practice for decision making in businesses.	1	1	1	1	2				1		1		2	1
CO6	Examine and utilize different analytical methods and case studies for the analysis of big data problems in contemporary businesses.	1	1	1	1	2					1	1	1	2	1

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
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CO1	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained to find a feasible solution for the Big Data related problems.
	PO2	2	Moderately mapped as the students will be able to understand analytical tools of Big Data.
	PO3	2	Moderately mapped as the students will be able to apply the knowledge to utilize Analytical tools.
	PO4	1	Slightly mapped as the students will be able to use design principles to provide valid conclusions for Big Data problems.
	PO5	2	Moderately mapped as the students will be able to use various Analytical Tools for Big Data solutions.
	PO6	2	Moderately mapped as the students will be to use the gained knowledge in professional engineering practice.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained to find a feasible solution for the Big Data Distributed environments.
	PO2	3	Strongly mapped as the students will be able to perform effectively apply Big Data constructs for managing clusters.
	PO3	2	Moderately mapped as the students will be able to apply the knowledge to use Map reduce commands.
	PO4	2	Moderately mapped as the students will be able to use design principles to provide valid conclusions for Big Data problems.
	PO5	2	Moderately mapped as the students will be able to use various Analytical Tools for Big Data solutions.
	PO7	1	Slightly mapped as the students will be to understand and demonstrate the gained knowledge in professional engineering practice.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO1	2	Moderately mapped as the students will be able to apply the knowledge gained to find a feasible solution for the Big Data management.
	PO2	2	Moderately mapped as the students will be able to use HDFS and Map reduce concepts.
	PO3	2	Moderately mapped as the students will be able to apply the knowledge to use HDFS and Map reduce concepts.
	PO4	2	Moderately mapped as the students will be able to use

			design principles to provide valid conclusions for Big Data problems.
	PO5	3	Strongly mapped as the students will be able to use various concepts of Big Data management.
	PO7	1	Slightly mapped as the students will be to understand and demonstrate the gained knowledge in professional engineering practice.
	PO11	1	Slightly mapped as the students will be able to apply the testing tools, techniques and strategies in Team work.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO1	1	Moderately mapped as the students will be able to apply the knowledge gained to find a feasible solution for the Big Data management.
	PO2	1	Moderately mapped as the students will be able to handle Big Data Application management.
	PO4	2	Moderately mapped as the students will be able to use design principles to provide valid conclusions for Big Data problems.
	PO5	2	Moderately mapped as the students will be able to use various Databases for Big Data management.
	PO11	1	Slightly mapped as the students will be able to apply the testing tools, techniques and strategies in Team work.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO5	PO1	1	Slightly mapped as the students will be able to apply the knowledge gained to find a feasible solution for Decision making.
	PO2	1	Slightly mapped as the students will be able to use Analytical methods for Decision making.
	PO3	1	Moderately mapped as the students will be able to apply the knowledge to classify Analytical tools.
	PO4	1	Slightly mapped as the students will be able to use design principles to provide valid conclusions for Big Data problems.
	PO5	2	Moderately mapped as the students will be able to use various Analytical Tools for Big Data solutions.
	PO9	1	Slightly mapped as the students will be able to apply the testing tools, techniques and strategies in Team work.
	PO11	1	Slightly mapped as the students will be able to apply the testing tools, techniques and strategies in own

CO3	Identify and apply various forms of representing data.					3								3	
CO4	Perform exploratory data analysis.				3	3									
CO5	Understand and apply various visualization techniques.					3									3
CO6	Demonstrate and enrich knowledge for various model validation techniques.					1									

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO4	3	Strongly mapped to analyze and interpret the variety of data
CO2	PO4	3	Strongly mapped to use process for interpretation
	PO5	3	Strongly mapped to use tools for modeling activities
CO3	PO5	3	Strongly mapped to select & apply forms of data representation
	PSO1	3	Strongly mapped to demonstrate in the field of CSE
CO4	PO4	3	Strongly mapped to explore data with analysis and interpretation
	PO5	3	Strongly mapped to apply techniques with prediction and modeling to engineering activities
CO5	PO5	3	Strongly mapped to apply visualization techniques for prediction and modeling
	PSO2	3	Strongly mapped to demonstrate in the field of CSE
CO6	PO5	1	Slightly mapped to demonstrate validation techniques using engineering tools

Course Name: Data Science Laboratory

Course Code: LPECS-109

CO	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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CO1	Understand concepts of R programming.											3	3	3	
CO2	Understand and demonstrate use of variables, data types and operations using R.			3											
CO3	Perform and use various mathematical constructs for better analysis of data		3		3										
CO4	Implement various visualization techniques for gaining more data insights.					3									3
CO5	Utilize the knowledge and techniques of Data Science for having more information gain form				3	3									
CO6	Design and develop projects using Data Science tools and techniques			3		3							3		

Justification of mapping:

CO Numbe	PO/PSO Number	Correlatio n Level	Justification of mapping
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r		(1/2/3)	
CO1	PO11	3	Strongly mapped to understand the concepts of R Language
	PO12	3	Strongly mapped to engage in lifelong learning for projects
	PSO1	3	Strongly mapped to apply in the field of computer science
CO2	PO3	3	Strongly mapped to demonstrate the use of variables and data types
CO3	PO2	3	Strongly mapped to analyze problems using principles of mathematics
	PO4	3	Strongly mapped to interpret data for valid conclusions
CO4	PO5	3	Strongly mapped to apply visualization techniques for data insights
	PSO2	3	Strongly mapped to apply in the field of computer science
CO5	PO4	3	Strongly mapped to utilize knowledge and techniques of data science
	PO5	3	Strongly mapped to utilize knowledge and techniques of data science
CO6	PO3	3	Strongly mapped to utilize knowledge and techniques of data science
	PO5	3	Strongly mapped to design and development of projects using data science
	PO11	3	Strongly mapped to manage projects for multidisciplinary field

Course Name: Human Computer Interaction

Course Code: PECS-123

CO	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Examine the capabilities of both humans and computers from the viewpoint of human information processing.	3					2		2	2	1			2	
CO2	Create the structure of human computer interaction models.		2	3	2	2		2							2
CO3	Apply an interactive design			2					1		2	2	2		2

	process and universal design principles to design HCI systems													
CO4	Depict and use HCI design principles, standards and guidelines.		2	3	2							2	2	2
CO5	Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.	2					3	2	2	2				2
CO6	Explain the HCI implications for designing multimedia/ecommerce/e-learning Web sites.	2	3			2						2		2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Strongly mapped as the students will be able to apply the knowledge gained to find a feasible solution for the problems designed.
	PO6	2	Moderately mapped as the students will be able to solve various complex Engineering problems.
	PO8	2	Moderately mapped as the students will be able to use his/her knowledge for ethical development.
	PO9	2	Moderately mapped as the students will be able to use the gained knowledge to work in a team.

	PO10	1	Slightly mapped as the students will be able to communicate properly with his gained knowledge in various human computer interactions.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO2	PO2	2	Moderately mapped as the students will be able to analyze various complex problems.
	PO3	3	Strongly mapped as the students will be able to apply the gained knowledge professionally to design and develop solutions for various human computer interactions.
	PO4	2	Moderately mapped as the students will be able to investigate various complex problems.
	PO5	2	Moderately mapped as the students will be able to use various tools for human computer interaction.
	PO7	2	Moderately mapped as the students will be able to make human computer interactions to sustain with the needs of environment.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO3	PO3	2	Moderately mapped as the students will be able to apply his knowledge to design and develop human computer interaction problems.
	PO8	1	Slightly mapped as the students will be able to apply his ethics to solve engineering problems.
	PO10	2	Moderately mapped as the students will be able to communicate properly to solve human computer interaction problems.
	PO11	2	Moderately mapped as the students will be able to manage projects related to human computer interaction models.
	PO12	2	Moderately mapped as the students will be able to interact various real time problems for lifelong learning.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO4	PO2	2	Moderately mapped as the students will be able to apply his knowledge to design and develop human computer interaction problems.
	PO3	3	Strongly mapped as the students will be able use his knowledge for designing various problems related to human computer interaction.
	PO4	2	Moderately mapped as the students will be able to conduct investigations for human computer interaction problems.
	PO11	2	Moderately mapped as the students will be able to manage projects related to human computer interaction models.
	PO12	2	Moderately mapped as the students will be able to interact various real time problems for lifelong learning.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO5	PO1	2	Moderately mapped as the students will be able to use engineering knowledge for various human computer interactions.
	PO6	3	Strongly mapped as the students will be able to design various engineering techniques and concepts to solve real time problems.
	PO7	2	Moderately mapped as the students will be able to use the gained

			design knowledge for human computer interactions.
	PO8	2	Moderately mapped as the students will be able to use ethics for human computer interaction models.
	PO9	2	Moderately mapped as the student will be able to use his knowledge of human computer interaction to work in a team and individually.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO6	PO1	2	Moderately mapped as the students will be able to use their engineering knowledge for human computer processing problems.
	PO2	3	Strongly mapped as the students will be able to analyze various problems of human computer interactions.
	PO5	2	Moderately mapped as the students will be able to use various tools to work for human computer interactions.
	PO11	2	Moderately mapped as the students will be able to manage problems related to human computer interaction models.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.

Course Name: Deep Learning

Course Code: PECS-124

CO	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the concept of Deep Learning, types of learning and computational units.	1		2	2	2							3	2	
CO2	Compare and analyze new optimization methods for neural networks, feed forward networks, Recurrent neural networks, Convolutional Neural		3	2		2				2		2			2

	Networks, Autoencoders and Boltzmann Machines														
CO3	Learn deep learning methods for working with sequential data, deep recurrent and memory networks.		2	3				2					2	2	1
CO4	Identify, formulate and analyze uses and Constraints of various Convolutional Neural Networks.	2	3				2		2		1			2	
CO5	Know the open issues in deep learning and have a grasp of the current research directions.				2	3		1		2		2			2
CO6	Apply deep learning mechanisms to various learning problems.	2					2		1		2			2	2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	1	Slightly mapped as the students will be able to apply the design engineering principles to various problems.

	PO3	2	Moderately mapped as the students will be able design solutions for Deep learning problems.
	PO4	2	Moderately mapped as the students will be able to investigate various complex problems to develop solution for them.
	PO5	2	Moderately mapped as the students will be able to apply various tools and techniques to solve deep learning problems.
	PO12	3	Strongly mapped as the students will be able to recognize the needs and prepare for lifelong learning.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO2	3	Strongly mapped as the students will be able to identify and formulate his knowledge in various core practices.
	PO3	2	Moderately mapped as the students will be able to apply the gained knowledge professionally to design and develop solutions for various real time problems.
	PO5	2	Moderately mapped as the students will be able to create and apply appropriate tools for solving various complex problems.
	PO9	2	Moderately mapped as the students will be able to work in a team for solving real time problems.
	PO11	2	Moderately mapped as the students will be able to demonstrate the knowledge and apply to his/her problems.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO3	PO2	2	Moderately mapped as the students will be able to apply his knowledge to analyze and formulate problems.
	PO3	3	Strongly mapped as the students will be able to design solutions for complex engineering problems.
	PO7	2	Moderately mapped as the students will be able to understand the impact of engineering solutions in society.
	PO12	2	Moderately mapped as the students will be able to recognize the needs and prepare for lifelong learning.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
CO4	PO1	2	Moderately mapped as the students will be able to apply the deep learning approach for complex engineering problems.
	PO2	3	Strongly mapped as the students will be able to analyze various engineering problems to apply deep learning methods.
	PO6	2	Moderately mapped as the students will be able to serve society with their knowledge of deep learning.
	PO8	2	Moderately mapped as the students will be able to use ethics in solving various real time problems.
	PO10	1	Slightly mapped as the students will be able to design documentation for various deep learning problems.
	PSO1	2	Moderately mapped as the students will be able to apply the gained

			knowledge in the field of CSE.
CO5	PO4	2	Moderately mapped as the students will be able to conduct investigations for designing deep learning problems.
	PO5	3	Strongly mapped as the students will be able to use various tools and techniques to solve real time problems.
	PO7	1	Slightly mapped as the students will be able to use the knowledge to sustain with the requirements of environment.
	PO9	2	Moderately mapped as the students will be able to apply knowledge in a team to work for deep learning problems.
	PO11	2	Moderately mapped as the student will be able to use his deep learning knowledge in project management and development.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO6	PO1	2	Moderately mapped as the students will be able to apply the engineering knowledge for solving real time problems.
	PO6	2	Moderately mapped as the students will be able to apply the gained knowledge to serve society.
	PO8	1	Slightly mapped as the students will be able to use various tools to work ethically.
	PO10	2	Moderately mapped as the students will be able to use the gained knowledge in communicating with end users.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.

Course Name: Deep Learning Laboratory

Course Code: LPECS-112

CO	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Implement deep learning algorithms, understand neural networks and traverse the layers of data abstraction which will empower to understand data more precisely.		3	2		2				2			3	2	

CO2	Learn topics such as convolutional neural networks, recurrent neural networks, training deep neural networks and high-level interfaces	3		2	3	2						2	2		3
CO3	Troubleshoot and improve deep learning models		2	3				2				2		2	1
CO4	Performing experiments in Deep Learning using real-world data	2	3				2		2		1			2	
CO5	Design the test procedures to Access the efficacy of the developed model.			3	2	2		1		2					2
CO6	Apply deep learning mechanisms to various learning problems.	2					2		1		2			2	2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO2	3	Strongly mapped as the students will be able to apply the design engineering principles to various problems.

	PO3	2	Moderately mapped as the students will be able design solutions for Deep learning problems.
	PO5	2	Moderately mapped as the students will be able to apply various tools and techniques to solve deep learning problems.
	PO9	2	Moderately mapped as the student will be able to apply the knowledge of deep learning individually and in team.
	PO12	3	Strongly mapped as the students will be able to recognize the needs of deep learning algorithms for lifelong learning.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO1	3	Strongly mapped as the students will be able to apply his knowledge of deep learning in various engineering practices.
	PO3	2	Moderately mapped as the students will be able to apply the gained knowledge professionally to design and develop solutions for various real time problems.
	PO4	3	Strongly mapped as the student will be able to conduct investigations for various real time problems of convolutional neural networks.
	PO5	2	Moderately mapped as the students will be able to create and apply appropriate tools for solving various CNN problems.
	PO11	2	Moderately mapped as the students will be able to demonstrate the knowledge in management of deep learning problems.
	PO12	2	Moderately mapped as the student will be able to use his gained knowledge of deep learning for life long leaning.
	PSO2	3	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
CO3	PO2	2	Moderately mapped as the students will be able to apply his knowledge to analyze and formulate deep learning models.
	PO3	3	Strongly mapped as the students will be able to design solutions to troubleshoot the complex deep learning problems.
	PO7	2	Moderately mapped as the students will be able to understand the impact of deep learning models in society.
	PO11	2	Moderately mapped as the students will be able to demonstrate the knowledge in management of deep learning problems.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
CO4	PO1	2	Moderately mapped as the students will be able to apply the deep learning approach for real world problems.
	PO2	3	Strongly mapped as the students will be able to analyze various engineering problems to apply deep learning methods.
	PO6	2	Moderately mapped as the students will be able to serve society with their knowledge of deep learning.
	PO8	2	Moderately mapped as the students will be able to use ethics in solving various real time problems.
	PO10	1	Slightly mapped as the students will be able to communicate

	passing models														
CO2	Study the main classes of parallel algorithms.		2										2		
CO3	Analyze the complexity and correctness models for parallel algorithms.				2										
CO4	Apply techniques and methods to design efficient parallel and distributed algorithms		1	2											
CO5	Understand the concepts and issues related to distributed systems.				3										
CO6	Manage performance, reliability and other issues while designing in distributed environment					1						1			

Justification of mapping:

CO	PO/PSO	Correlation	Justification of mapping
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Number	Number	Level (1/2/3)	
CO1	PO1	1	Slightly mapped as the students will be able to understand and learn the concepts.
	PSO2	1	Slightly mapped as the students will be able to apply the concepts.
CO2	PO2	2	Moderately mapped as the students will be able to identify and analyze the concepts.
	PSO1	2	Moderately mapped as the students will be able to apply the knowledge after analyzing the concepts..
CO3	PO4	2	Moderately mapped as the students will be able to gather and analyze the knowledge related to problem.
CO4	PO2	1	Slightly mapped as the students will be able to understand and analyze the principles.
	PO3	2	Moderately mapped as the students will be able to design the solution.
CO5	PO4	3	Strongly mapped as the students will be able to understand and use the knowledge.
CO6	PO11	2	Slightly mapped as the students will be able to manage and communicate effectively while designing.
	PO5	2	Slightly mapped as the students will be able to apply the knowledge they had in resolving issues.

Course Name: Mobile Application Development

Course Code: PECS-130

CO	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Demonstrate the android features and develop application using Android.	1		2	2	2							3	2	
CO2	Utilize rapid prototyping techniques to design and develop sophisticated mobile Interfaces.		3	2		2				2		2			2

CO3	Design and develop mobile application that accommodates user specific requirements and constraints analysis.		2	3				2					2	2	1
CO4	Understand the basic principles of Mobile Application to develop different applications.	2	3				2		2		1			2	
CO5	Program mobile applications for the Android operating system that use basic and advanced phone features.				2	3		1		2		2			2
CO6	Implement the concept for creating Hybrid Mobile Application using React Native.	2					2		1		2			2	2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	1	Slightly mapped as the students will be able to apply his engineering

			knowledge to develop various android applications.
	PO3	2	Moderately mapped as the students will be able develop solutions for various android problems.
	PO4	2	Moderately mapped as the students will be able to conduct investigations on various android applications.
	PO5	2	Moderately mapped as the students will be able to apply various modern tools and techniques for solving android problems.
	PO12	3	Strongly mapped as the students will be able to recognize the needs of android programming for lifelong.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO2	PO2	3	Strongly mapped as the students will be able to identify and formulate his knowledge in developing sophisticated mobile Interfaces.
	PO3	2	Moderately mapped as the students will be able to apply the gained knowledge professionally to design and develop sophisticated mobile Interfaces.
	PO5	2	Moderately mapped as the students will be able to apply appropriate tools for designing sophisticated mobile Interfaces.
	PO9	2	Moderately mapped as the students will be able to work in a team for solving real time problems in mobile inter phases.
	PO11	2	Moderately mapped as the students will be able to demonstrate the knowledge of prototyping in sophisticated mobile Interfaces.
	PSO2	2	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
CO3	PO2	2	Moderately mapped as the students will be able to apply his knowledge to design and develop various mobile applications.
	PO3	3	Strongly mapped as the students will be able to design solutions for complex mobile applications.
	PO7	2	Moderately mapped as the students will be able to understand the impact of various mobile solutions in society.
	PO12	2	Moderately mapped as the students will be able to recognize the needs of user specific requirements and constraints analysis in development.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
CO4	PO1	2	Moderately mapped as the students will be able to apply the basic principles of Mobile Application to develop different applications
	PO2	3	Strongly mapped as the students will be able to analyze mobile applications to develop other different applications.
	PO6	2	Moderately mapped as the students will be able to serve society with their knowledge of mobile applications.
	PO8	2	Moderately mapped as the students will be able to use ethics in solving various real time mobile applications.
	PO10	1	Slightly mapped as the students will be able to design documentation for various mobile applications.

	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO5	PO4	2	Moderately mapped as the students will be able to Program mobile applications for the Android operating system
	PO5	3	Strongly mapped as the students will be able to use various tools and techniques to program various mobile applications for the Android operating system.
	PO7	1	Slightly mapped as the students will be able to use the knowledge of android operating system to sustain with environment.
	PO9	2	Moderately mapped as the students will be able to apply knowledge in a team to work for android operating system.
	PO11	2	Moderately mapped as the student will be able to use his android operating system knowledge in mobile application development.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.
CO6	PO1	2	Moderately mapped as the students will be able to apply his React Native knowledge for solving Hybrid Mobile Application.
	PO6	2	Moderately mapped as the students will be able to apply his React Native knowledge to serve society.
	PO8	1	Slightly mapped as the students will be able to use various tools to work ethically to develop hybrid mobile applications.
	PO10	2	Moderately mapped as the students will be able to use the gained knowledge in communicating with end users of hybrid approach.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
	PSO2	2	Moderately mapped as the students will be able to apply the gained knowledge in real time problems.

Course Name: Mobile Application Development Laboratory

Course Code: LPECS-115

CO	Statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the basic principles of Mobile application development	1	2	2	2	2							3	2	
CO2	Build a native application using GUI components and Mobile application		3	2		2			2	2		2			2

	development framework														
CO3	Develop an application using basic graphical primitives and databases	2	2	3				2					2	2	1
CO4	Construct an application using multi-threading and RSS feed	2	3				2		2		1			2	
CO5	Make use of location identification using GPS in an application				2	3		1		2		2			2
CO6	Model new applications to handheld devices	2					2		1		2			2	2

Justification of mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	1	Slightly mapped as the students will be able to apply his engineering knowledge of basic principles for mobile application development.
	PO2	2	Moderately mapped as the students will be able to analyze different mobile applications.
	PO3	2	Moderately mapped as the students will be able develop solutions for different mobile applications.
	PO4	2	Moderately mapped as the students will be able to conduct investigations on different mobile applications.
	PO5	2	Moderately mapped as the students will be able to apply various modern tools and techniques for different mobile applications.
	PO12	3	Strongly mapped as the students will be able to recognize the needs of different mobile applications for lifelong.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.

CO2	PO2	3	Strongly mapped as the students will be able to build a native application using GUI components and Mobile application development framework.
	PO3	2	Moderately mapped as the students will be able to apply the gained knowledge of GUI design for mobile application development framework.
	PO5	2	Moderately mapped as the students will be able to apply appropriate tools for Mobile application development framework.
	PO8	2	Moderately mapped as the students will be able to work with ethics for Mobile application development framework.
	PO9	2	Moderately mapped as the students will be able to work in a team for mobile application development framework.
	PO11	2	Moderately mapped as the students will be able to demonstrate the knowledge of mobile application development framework.
	PSO2	2	Strongly mapped as the students will be able to apply the gained knowledge in real time problems.
CO3	PO1	2	Moderately mapped as the students will be able to apply his knowledge to develop applications using basic graphical primitives and databases.
	PO2	2	Moderately mapped as the students will be able to apply his knowledge to develop applications using basic graphical primitives and databases.
	PO3	3	Strongly mapped as the students will be able to develop applications using basic graphical primitives.
	PO7	2	Moderately mapped as the students will be able to understand the impact of various graphical primitives and databases.
	PO12	2	Moderately mapped as the students will be able to recognize the needs of user specific requirements for basic graphical primitives and databases.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
	PSO2	1	Slightly mapped as the students will be able to apply the gained knowledge in real time problems.
CO4	PO1	2	Moderately mapped as the students will be able to apply the basic principles of Mobile Application to Construct an application using multi-threading and RSS feed.
	PO2	3	Strongly mapped as the students will be able to analyze mobile applications to Construct an application using multi-threading and RSS feed.
	PO6	2	Moderately mapped as the students will be able to serve society with their knowledge of multi-threading.
	PO8	2	Moderately mapped as the students will be able to use ethics in solving various multi-threaded problems.
	PO10	1	Slightly mapped as the students will be able to design documentation after constructing applications using multi-threading and RSS feed.
	PSO1	2	Moderately mapped as the students will be able to apply the gained knowledge in the field of CSE.
CO5	PO4	2	Moderately mapped as the students will be able to Make use of

CO3	Design and construct hardware and/or software system, component, or process to meet desired needs.			3		3						3	3	
CO4	Choose and apply emerging trends and contemporary project management methodologies in context of computer science and engineering.											3		3
CO5	Test and validate various modules of planned project.				2	2								
CO6	Demonstrate the ability to work, communicate effectively as a team and to write and present technical reports.									1	1			

Justification of Mapping:

CO Number	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO1	PO1	3	Knowledge of mathematical proofs, techniques and algorithms to achieve project objectives.

	PO8	3	Apply ethical principles and commit to professional ethics and responsibilities while executing project work.
	PSO1	3	Apply theoretical and practical knowledge gained for developing software solutions to the real time problems.
CO2	PO2	3	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions.
	PO3	3	Design solutions for complex engineering problems and design system components or processes that meet the specified objectives.
CO3	PO3	3	Design projects for complex engineering problems and design system components or processes that meet the specified objectives.
	PO5	3	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools to meet project objectives.
	PO12	3	Ability to engage in independent and life-long learning in the broadest context of technological change.
	PSO1	3	Apply theoretical and practical knowledge gained by developing major projects to the real time problems.
CO4	PO11	3	Demonstrate knowledge and understanding of the engineering and project management principles and apply these to project work, as a member and leader in a project team, to manage projects and in multidisciplinary environments.
	PSO2	3	To apply and demonstrate the acquired knowledge of emerging trends and contemporary technologies via project implementations in the field of computer science and engineering.
CO5	PO4	2	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions through research-based projects.
	PO5	2	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools to test and validate project modules.
CO6	PO9	1	Function effectively as an individual, and as a member or leader in diverse project teams, and in multidisciplinary settings.
	PO10	1	To communicate effectively and write effective reports and design documentation, make effective presentations to support the project work.

	components for project planning and designing purpose.													
C O5	Implement various CICD tools and techniques for effective application of relevant standards for project management.										3			
C O6	Identify the benefits of various tools for software debugging, UML Diagrams and various project charts		2			3								3

Justification of mapping:

CO	PO/PSO Number	Correlation Level (1/2/3)	Justification of mapping
CO 1	PO1	2	Moderately mapped as the students will be able to assess societal, health, safety, legal and cultural issues relevant to professional engineering practice.
	PO6	1	Strongly mapped as the students will be able understand ethical principles and norms of engineering practice.
	PSO1	3	Slightly mapped as the students will be to use the gained knowledge lifelong.
CO 2	PO5	3	Moderately mapped as the students will be able to assess societal, health, safety , legal and cultural issues relevant to professional engineering practice..
	PO6	1	Slightly mapped as the students will be able to understand the value of working in a team .
	PO7	1	
CO 3	PO2	1	Strongly mapped as the students will be able to assess societal, health, safety , legal and cultural issues relevant to professional engineering practice.
	PO5	2	Moderately mapped as the students will be able understand ethical principles and norms of engineering practice.
CO 4	PO1	1	Slightly mapped as the students will be able understand the value of working in a team .
	PO3	1	Strongly mapped as the students will be able to make effective presentation and give clear instructions
	PO5	3	Slightly mapped as the students will be able appreciate the significance of working in a team
CO 5	PO11	3	Slightly mapped as the students will be able to understand the need of sustainable development.
CO 6	PO2	2	Strongly mapped as the students will be able understand ethical principles and norms of engineering practice.

	PO5	3	Slightly mapped as the students will be able understand the value of working in a team .
	PSO2	3	Moderately mapped as the students will be able to make effective presentation and give clear instructions