ST. JOSEPH'S
COLLEGE OF ENGINEERING AND TECHNOLOGY, - PALAI -

Choondacherry P.O., Palai, Kottayam Pin 686579, Kerala,India
Phone: +91 4822-239700, 239301, 239302
Email: info@sjcetpalai.ac.in • Website: www.sjcetpalai.ac.in

Cycle 1 - NAAC Accreditation 2023

Criterion – 2

2.6 Student Performance and Learning Outcome

2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website and attainment of POs and COs are evaluated

Submitted to:

National Assessment and Accreditation Council

Criterion – 2

2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website and attainment of POs and COs are evaluated

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

HUT 101 LIFE SKILLS (2019 scheme)-

Semester : I

Course Title : **LIFE SKILLS**

Course Code : HUN 101

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
HUN101.1	Define and Identify different life skills required in personal and professional life	**K_3**
HUN101.2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.	**K_3**
HUN101.3	Explain the basic mechanics of effective communication and demonstrate these through presentations	**K_2**
HUN101.4	Take part in group discussions	**K_5**
HUN101.5	Use appropriate thinking and problem solving techniques to solve new problems	**K_3**
HUN101.6	Understand the basics of teamwork and leadership	**K_6**

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
HUN101.1	-	-	-	-	-	-	-	1	-	3	-	2	-	-
HUN101.2	-	-	-	-	-	-	-	-	-	1	-	3	-	-
HUN101.3	-	-	1	-	-	1	-	-	1	3	-	-	-	-
HUN101.4	-	-	-	-	-	-	-	-	-	3	-	1	1	-
HUN101.5	-	-	1	-	-	-	-	-	2	3	-	-	-	-
HUN101.6	1	-	-	-	-	1	-	-	1	3	-	-	1	-
	1	-	1	-	-	1	-	1	1	3	-	2	1	-

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JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO6 – PO1	1	Graduate will be able to understand the significance of teamwork in bringing solutions to complex engineering problems
CO3 – PO3	1	Graduate will be able to comprehend the need for effective communication and its significance in understanding the specified needs in designing a system with needed consideration
CO5 – PO3	1	Graduate will be able to apply the appropriate approach in developing novel solution to engineering problems taking into account the cultural, societal and environmental considerations.
CO3 – PO6	1	Graduate will be able to develop effective presentation based on the reasoning applied on information obtained from contextual knowledge
CO6- PO6	1	Graduates will be able to understand the implications of teamwork and effective leadership to help in reaching plausible conclusions taking appropriate considerations
CO1-PO8	1	Graduates will be able to the right moral and ethical values that are close to their core values to help develop themselves as better professionals
CO3 – PO9	1	Graduates will understand the need for effective communication to work effectively in a team.
CO5- PO9	2	Graduate will able to apply the techniques required as an individual or as a team member to create effective presentation
CO6-PO9	1	Graduate will understand the need for teamwork and leadership skills to effectively work in a team or as an individual
CO1-PO10	3	Graduate will be able to identify the right skill that needs to be developed in communicating effectively in complex engineering problems
CO2-PO10	1	Graduate will be able to develop the skills needed to understand the way in communicating and comprehending to the other member in his/her team
CO3-PO10	3	Graduate will be able to communicative effectively in engineering activites by developing the needed understanding to set up an effective presentation
CO4-PO10	3	Graduate will be able to display healthy participation in group discussions in developing effective solution
CO5-PO10	3	Graduate will be able to apply appropriate thinking technique to develop design documentation and reports
CO6-PO10	3	Graduate able to understand the basic function of team/group and how effective communications plays a part in it

CO1-PO12	2	Graduates will be able to recognize the need for developing life skills in their life that would culminate to importance of life-long learning for their professional life
CO2-PO12	3	Graduates will be able to understand the methods of self-awareness and managing of stress to help him/her better equip for independent and life – long learning
CO4-PO12	1	Graduate will be able to discuss his/her ideas related to technology and its advancement effectively that would channel towards the right direction for research
CO4-PSO1	1	Graduate will understand the significance of effective group discussion to help in design of complex electronic systems
CO6-PSO1	1	Graduate will understand the need for teamwork and leadership in design of complex electronic systems

COURSE OUTCOME: EST102 COMPUTER PROGRAMMING

The students will be able to

CO	Course outcome	Knowledge level
EST102.1	Analyze a computational problem and develop an algorithm/flowchart to find its solution	K3
EST102.2	Develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.	K3
EST102.3	Write readable C programs with arrays, structure or union for storing the data to be processed	K3
EST102.4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem	K3
EST102.5	Write readable C programs which use pointers for array processing and parameter passing	K3
EST102.6	Develop readable C programs with files for reading input and storing output	K3

CO-PO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	2	-	-	-	3	3	3	3	-	2
CO2	3	3	3	2	2	-	-	-	-	2	-	3	3	-	-
CO3	3	3	3	1	2	-	-	-	-	2	-	3	3	2	-
CO4	3	3	3	1	2	-	-	-	-	2	3	3	3	2	-
CO5	3	3	-	-	2	-	-	-	-	1	-	3	3	1	-
CO6	3	3	-	-	2	-	-	-	-	1	-	3	3	1	-
AVG	3	3	3	1.5	2	2	-	-	-	1.83	3	3	3	1.5	2

Mapping	Low/Medium/ High	Justification
CO1-PO1	H	Students will be able to use Engineering knowledge by Analyzing a computational problem and develop an algorithm/flowchart.
CO1-PO2	H	With analyzing a computational problem and develop an algorithm/flowchart, the students are able to analyze complex engineering problems.
CO1-PO3	H	By analyzing a computational problem and develop an algorithm/flowchart, the students are able to design solutions for complex engineering problems.
CO1-PO4	M	Through analyzing a computational problem and develop an algorithm/flowchart, the students are able to conduct investigations of complex problems.
CO1-PO6	M	Students will be able to apply knowledge to assess social issues and responsibilities relevant to the professional engineering practice through analyzing a computational problem and developing solutions for that.
CO1-PO10	H	With analyzing a computational problem and develop an algorithm/flowchart, the students are able to communicate effectively on complex engineering activities with the engineering community.
CO1-PO11	H	The students will be able to demonstrate knowledge and understanding of the engineering principles and apply them in multi-disciplinary environments with the knowledge of analyzing a computational problem and developing an algorithm/flowchart.
CO1-PO12	H	By analyzing a computational problem and develop an algorithm/flowchart, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change.
CO1-PSO1	H	Through analyzing a computational problem and develop an algorithm/flowchart, the students are able to analyze, design and develop computing solutions.
CO1-PSO3	M	Students will be able to adapt to emerging technologies by providing innovative ideas and solutions to novel problems with the knowledge of analyzing a computational problem and developing Solutions.
CO2-PO1	H	With the knowledge of different Arithmetic, Logical, Relational or Bitwise operators, the students will be able to use Engineering knowledge.
CO2-PO2	H	With developing programs using branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators, the students are able to analyze complex engineering problems.

CO2-PO3	H	With the knowledge of branching and looping statements and operators and by developing programs using them, the students are able to design solutions for complex engineering problems.
CO2-PO4	M	The students are able to conduct investigations of complex problems with the knowledge of programming using branching and looping statements and operators.
CO2-PO5	M	With the knowledge of programming using branching and looping statements and operators, students will be able to select and apply appropriate techniques and IT tools like prediction and modelling to complex problems.
CO2-PO10	M	The students are able to communicate effectively on complex engineering activities with the engineering community with the knowledge of programming using branching and looping statements.
CO2-PO12	H	With the knowledge of different programming using branching and looping statements, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change.
CO2-PSO1	H	Students will be able to analyze, design and develop computing solutions with the knowledge of programming using branching and looping statements.
CO3-PO1	H	By examining how arrays, structure or union are used for storing data to be processed, the students will be able to apply knowledge in fundamentals of engineering and mathematics.
CO3-PO2	H	Students will be able to perform analysis of complex engineering problems by examining how arrays, structure or union are used for storing data to be processed
CO3-PO3	H	With the knowledge of how arrays, structure or union are used for storing data to be processed, the students will be able to design solutions for complex engineering problems.
CO3-PO4	L	With the knowledge of how arrays, structure or union are used for storing data to be processed, the students will be able to conduct investigations of complex problems.
CO3-PO5	M	With the knowledge of how arrays, structure or union are used for storing data to be processed, students will be able to select and apply appropriate techniques and IT tools like prediction and modelling to complex problems.
CO3-PO10	M	Students will be able to communicate effectively on complex engineering activities with the engineering community with the knowledge of how arrays, structure or union are used for storing data to be processed.
CO3-PO12	H	With the knowledge of how arrays, structure or union are used for storing data to be processed, the students will be able to recognize

		the need for and to engage in independent and life-long learning in the broadest context of technological change
CO3-PSO1	H	Students will be able to analyze, design and develop computing solutions with the knowledge of how arrays, structure or union are used for storing data to be processed.
CO3-PSO2	M	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge of how arrays, structure or union are used for storing data to be processed.
CO4-PO1	H	Students will be able to use Engineering knowledge with developing readable multi-function C programs to find the solution to the computational problem.
CO4-PO2	H	Students will be able to perform analysis of complex engineering problems with developing readable multi-function C programs to find the solution to the computational problem.
CO4-PO3	H	Students will be able to design solutions for complex engineering problems by dividing a problem into modules and developing readable multi-function C programs to find the solution to the computational problem
CO4-PO4	L	With the knowledge of sub modules and by developing readable multi-function C programs to find the solution to the computational problem, the students will be able to conduct investigations of complex problems.
CO4-PO5	M	With the knowledge of Identifying Subtasks and developing readable multi-function C programs to find the solution to the computational problem, students will be able to select and apply appropriate techniques and IT tools like prediction and modelling to complex problems.
CO4-PO10	M	Students will be able to communicate effectively on complex engineering activities with the engineering community with the knowledge of Identifying Subtasks and developing readable multi-function C programs to find the solution to the computational problem.
CO4-PO11	H	The students will be able to demonstrate knowledge and understanding of the engineering principles and apply them in multi-disciplinary environments with the knowledge of Identifying Subtasks and developing readable multi-function C programs to find the solution to the computational problem
CO4-PO12	H	With the knowledge of Identifying Subtasks and developing readable multi-function C programs to find the solution to the computational problem, the students will be able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change

CO4-PSO1	H	Students will be able to analyze, design and develop computing solutions with the knowledge of Identifying Subtasks and developing readable multi-function C programs to find the solution to the computational problem.
CO4-PSO2	M	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge of Identifying Subtasks developing readable multi-function C programs to find the solution to the computational problem.
CO5-PO1	H	Students will be able to use fundamental Engineering knowledge by writing readable C programs which use pointers for array processing and parameter passing.
CO5-PO2	H	Students will be able to perform analysis of complex engineering problems with the knowledge of C programs which use pointers for array processing and parameter passing.
CO5-PO5	M	By writing readable C programs which use pointers for array processing and parameter passing, students will be able to select and apply appropriate techniques and IT tools like prediction and modelling to complex problems.
CO5-PO10	L	With writing C programs which use pointers for array processing and parameter passing, the students will be able to communicate effectively on complex engineering activities with the engineering community
CO5-PO12	H	With the knowledge of programs which use pointers for array processing and parameter passing., the students will be able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CO5-PSO1	H	Students will be able to analyze, design and develop computing solutions by writing readable C programs which use pointers for array processing and parameter passing.
CO5-PSO2	L	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge of writing C programs which use pointers for array processing and parameter passing.
CO6-PO1	H	Students will be able to use Engineering knowledge with developing readable C programs with files for reading input and storing output.
CO6-PO2	H	Students will be able to perform analysis of complex engineering problems with the knowledge of developing C programs with files for reading input and storing output.
CO6-PO5	M	With developing readable C programs with files for reading input and storing output, the students will be able to conduct investigations of complex problems.

CO6-PO10	L	Through developing readable C programs with files for reading input and storing output, the students will be able to communicate effectively on complex engineering activities with the engineering community.
CO6-PO12	H	With the knowledge of the concept of File system for handling data storage and developing readable C programs with files, the students will be able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change.
CO6-PSO1	H	Students will be able to analyze, design and develop computing solutions with the knowledge of the concept of File system for handling data storage and developing readable C programs with files.
CO6-PSO2	L	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge of File system for handling data storage and developing readable C programs with files.

SEMESTER 3

Department of Computer Science and Engineering

Programme : Bachelor of Technology | Course Code: CST203

Course Name: LOGIC SYSTEM DESIGN | Semester: 3

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CST203.CO1	Illustrate decimal, binary, octal, hexadecimal and BCD number systems, perform conversions among them and do the operations - complementation, addition, subtraction, multiplication and division on binary numbers (Cognitive Knowledge level: Understand)	K2
CST203.CO2	Simplify a given Boolean Function and design a combinational circuit to implement the simplified function using Digital Logic Gates (Cognitive Knowledge level: Apply)	K3
CST203.CO3	Design combinational circuits - Adders, Code Convertors, Decoders, Magnitude Comparators, Parity Generator/Checker and design the Programmable Logic Devices - ROM and PLA. (Cognitive Knowledge level: Apply)	K3
CST203.CO4	Design sequential circuits - Registers, Counters and Shift Registers. (Cognitive Knowledge level: Apply)	K3
CST203.CO5	Use algorithms to perform addition and subtraction on binary, BCD and floating-point numbers (Cognitive Knowledge level: Understand)	K2

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CST203.CO1	2	2	-	-	-	-	-	-	-	-	-	3	2	-	2
CST203.CO2	3	3	3	3	-	3	-	-	-	-	-	3	3	-	3
CST203.CO3	3	3	3	3	-	3	-	-	-	-	-	3	3	-	3
CST203.CO4	3	3	3	3	-	3	-	-	-	-	-	3	3	-	3
CST203.CO5	3	3	3	-	-	-	-	-	-	-	-	3	3	-	3
AVG	2.8	2.8	3	3	-	3	-	-	-	-	-	3	2.8	-	2.8

Correlation : 1-Low, 2-moderate, 3-high, No Correlation '-'

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JUSTIFICATION

CO-PO	LEVEL (Low/ Moderate/ High)	JUSTIFICATION
CST203.CO1-PO1	Moderate	The knowledge of number system conversions and the arithmetic operations helps the students to understand the solution of simple engineering problems
CST203.CO2-PO1	High	By designing a combinational circuit to implement simplified Boolean functions, the students will be able to solve complex engineering problems.
CST203.CO3-PO1	High	By designing a combinational circuit and PLD the students will be able to solve complex engineering problems.
CST203.CO4-PO1	High	By designing a sequential circuit, the students will be able to solve complex engineering problems
CST203.CO5-PO1	High	By using the algorithms for arithmetic operations on different number systems, help the students to understand complex engineering problems.
CST203.CO1-PO2	Moderate	The knowledge of number system conversions and the arithmetic operations helps the students to understand the formulation of simple engineering problems
CST203.CO2-PO2	High	By designing a combinational circuit to implement simplified Boolean functions, the students will be able to identify and formulate complex engineering problems.
CST203.CO3-PO2	High	By designing a combinational circuit and PLD the students will be able to identify and formulate complex engineering problems.
CST203.CO4-PO2	High	By designing a sequential circuit, the students will be able to identify and formulate complex engineering problems
CST203.CO5-PO2	High	By using the algorithms for arithmetic operations on different number systems, help the students to identify and formulate of complex engineering problems.
CST203.CO2-PO3	High	By designing a combinational circuit to implement simplified Boolean functions, the students will be able to design solutions for complex engineering problems.

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CST203.CO3-PO3	High	By designing a combinational circuit and PLD the students will be able to design solutions for complex engineering problems.
CST203.CO4-PO3	High	By designing a sequential circuit, the students will be able to design solutions for complex engineering problems
CST203.CO5-PO3	High	By using the algorithms for arithmetic operations on different number systems, help the students to design solutions for of complex engineering problems.
CST203.CO2-PO4	High	By designing a combinational circuit to implement simplified Boolean functions, the students will be able to use research-based knowledge for the analysis and synthesis of data
CST203.CO3-PO4	High	By designing a combinational circuit and PLD the students will be able to use research-based knowledge for the analysis and synthesis of data
CST203.CO4-PO4	High	By designing a sequential circuit, the students will be able to use research-based knowledge for the analysis and synthesis of data
CST203.CO2-PO6	High	By designing a combinational circuit to implement simplified Boolean functions, the students will be able to apply reasoning to assess the issues in different areas of society and address the responsibilities related to professional engineering practice.
CST203.CO3-PO6	High	By designing a combinational circuit and PLD the students will be able to assess the issues in different areas of society and address the responsibilities related to professional engineering practice.
CST203.CO4-PO6	High	By designing a sequential circuit, the students will be able to assess the issues in different areas of society and address the responsibilities related to professional engineering practice.
CST203.CO1-PO12	High	The knowledge of number system conversions and the arithmetic operations helps the students can engage in continuous learning
CST203.CO2-PO12	High	By designing a combinational circuit to implement simplified Boolean functions, the students can engage in continuous learning
CST203.CO3-PO12	High	By designing a combinational circuit and PLD the students can engage in continuous learning
CST203.CO4-PO12	High	By designing a sequential circuit, the students can engage in continuous learning

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CST203.CO5-PO12	High	By using the algorithms for arithmetic operations on different number systems, the students can engage in continuous learning
CST203.CO1-PSO1	Moderate	The knowledge of number system conversions and the arithmetic operations helps the students to analyze, design and develop simple computing solutions
CST203.CO2-PSO1	High	By designing a combinational circuit to implement simplified Boolean functions, the students will be able to analyze, design and develop computing solutions
CST203.CO3-PSO1	High	By designing a combinational circuit and PLD the students will be able to analyze, design and develop computing solutions
CST203.CO4-PSO1	High	By designing a sequential circuit, the students will be able to analyze, design and develop computing solutions
CST203.CO5-PSO1	High	By using the algorithms for arithmetic operations on different number systems, help the students to analyze, design and develop computing solutions
CST203.CO1-PSO3	Moderate	The knowledge of number system conversions and the arithmetic operations helps the students to adapt to emerging information and communication technologies
CST203.CO2-PSO3	High	By designing a combinational circuit to implement simplified Boolean functions, the students will be able to adapt to emerging information and communication technologies
CST203.CO3-PSO3	High	By designing a combinational circuit and PLD the students will be able to adapt to emerging information and communication technologies adapt to emerging information and communication technologies
CST203.CO4-PSO3	High	By designing a sequential circuit, the students will be able to adapt to emerging information and communication technologies
CST203.CO5-PSO3	High	By using the algorithms for arithmetic operations on different number systems, help the students to adapt to emerging information and communication technologies

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Programme : Bachelor of Technology | Course Code: CST201

Course Name: Data Structures | Semester: 3

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CST201.CO1	Design an algorithm for a computational task and calculate the time/space complexities of that algorithm (Cognitive Knowledge Level: Apply)	K3
CST201.CO2	Identify the suitable data structure (array or linked list) to represent a data item required to be processed to solve a given computational problem and write an algorithm to find the solution of the computational problem (Cognitive Knowledge Level: Apply)	K3
CST201.CO3	Write an algorithm to find the solution of a computational problem by selecting an appropriate data structure (binary tree/graph) to represent a data item to be processed (Cognitive Knowledge Level: Apply)	K3
CST201.CO4	Store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set (Cognitive Knowledge Level: Apply)	K3
CST201.CO5	Select appropriate sorting algorithms to be used in specific circumstances (Cognitive Knowledge Level: Analyze)	K4
CST201.CO6	Design and implement Data Structures for solving real world problems efficiently (Cognitive Knowledge Level: Apply)	K3

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CS352.CO1	3	2	1	1	-	1	-	-	-	-	-	3	3	-	1
CS352.CO2	3	3	3	2	-	1	-	-	-	-	-	3	3	-	3
CS352.CO3	3	3	3	2	-	1	-	-	-	-	-	3	3	-	3
CS352.CO4	3	3	3	1	-	1	-	-	-	-	-	3	3	-	3
CS352.CO5	2	2	2	1	-	1	-	-	-	-	-	3	3	-	3
CS352.CO6	3	3	3	2	-	1	-	-	-	-	-	3	3	-	3
AVG	2.83	2.67	2.5	1.5	-	1	-	-	-	-	-	3	3	-	2.67

Correlation : 1-Low, 2-moderate, 3-high, No Correlation '-'

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JUSTIFICATION

CO-PO	LEVEL (Low/ Moderate/ High)	JUSTIFICATION
CST 201 CO1-PO1	H	Learning to design an algorithm for a computational task and calculate the time/space complexities of that algorithm helps the students in the solutions for complex engineering problems.
CST 201 CO1-PO2	**M**	Learning to design an algorithm for a computational task and calculate the time/space complexities of that algorithm helps the students to identify and formulate solutions of complex engineering problem.
CST 201 CO1-PO3	**L**	Learning to design an algorithm for a computational task and calculate the time/space complexities of that algorithm helps the students to design solution to an engineering problem.
CST 201 CO1-PO4	**L**	Learning to design an algorithm for a computational task and calculate the time/space complexities of that algorithm, helps the students to investigate and analyze complex problems.
CST 201 CO1-PO6	L	Learning to design an algorithm for a computational task and calculate the time/space complexities of that algorithm, helps the students to solve health, safety and legal servicing problems efficiently.
CST 201 CO1-PO12	H	Learning to design an algorithm for a computational task and calculate the time/space complexities of that algorithm, helps to learn many other topics of engineering and help for a lifelong learning.
CST 201 CO1-PSO1	H	Learning to design an algorithm for a computational task and calculate the time/space complexities of that algorithm, helps the students to analyze, design and develop computing solutions.
CS 201 CO1-PSO3	L	Learning to design an algorithm for a computational task and calculate the time/space complexities of that algorithm help the students to adapt to modern information and communication technologies
CST 201 CO2-PO1	H	By identifying the suitable data structure like array or linked list to represent a data item required to be processed to solve a given computational problem and write an algorithm to find the solution of the

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		computational problem, the students will be able to solve complex engineering problems.
CST 201 CO2-PO2	**H**	By identifying the suitable data structure like array or linked list to represent a data item required to be processed to solve a given computational problem and write an algorithm to find the solution of the computational problem, the students will be able to identify and formulate complex engineering problems.
CST 201 CO2-PO3	**H**	By identifying the suitable data structure like array or linked list to represent a data item required to be processed to solve a given computational problem and write an algorithm to find the solution of the computational problem, the students will be able to design of solutions to complex engineering problems.
CST 201 CO2-PO4	**M**	By identifying the suitable data structure like array or linked list to represent a data item required to be processed to solve a given computational problem and write an algorithm to find the solution of the computational problem, helps the students to investigate and analyze complex problems.
CST 201 CO2-PO6	**L**	By identifying the suitable data structure like array or linked list to represent a data item required to be processed to solve a given computational problem and write an algorithm to find the solution of the computational problem, helps the students to solve health, safety and legal servicing problems efficiently.
CST 201 CO2-PO12	H	By identifying the suitable data structure like array or linked list to represent a data item required to be processed to solve a given computational problem and write an algorithm to find the solution of the computational problem, helps the students to learn many other topics of engineering and help for a lifelong learning.
CST 201 CO2-PSO1	H	By identifying the suitable data structure like array or linked list to represent a data item required to be processed to solve a given computational problem and write an algorithm to find the solution of the computational problem, helps the students to analyze, design and develop computing solutions.
CST 201 CO2-PSO3	H	By identifying the suitable data structure like array or linked list to represent a data item required to be processed to solve a given computational problem and write an algorithm to find the solution of the

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		computational problem, helps the students to adapt to modern information and communication technologies
CST 201 CO3-PO1	H	By learning to write an algorithm to find the solution of a computational problem by selecting an appropriate non-linear data structure to represent a data item to be processed, helps the students to solve complex engineering problems
CST 201 CO3-PO2	**H**	By learning to write an algorithm to find the solution of a computational problem by selecting an appropriate non-linear data structure to represent a data item to be processed, helps the students to identify and formulate complex engineering problems
CST 201 CO3-PO3	H	By learning to write an algorithm to find the solution of a computational problem by selecting an appropriate non-linear data structure to represent a data item to be processed, helps the students to design solutions to complex engineering problems
CST 201 CO3-PO4	**M**	By learning to write an algorithm to find the solution of a computational problem by selecting an appropriate non-linear data structure to represent a data item to be processed, helps the students to solve complex engineering problems.
CST 201 CO3-PO6	L	By learning to write an algorithm to find the solution of a computational problem by selecting an appropriate non-linear data structure to represent a data item to be processed, helps the students to solve safety and legal servicing problems efficiently
CST 201 CO3-PO12	H	By learning to write an algorithm to find the solution of a computational problem by selecting an appropriate non-linear data structure to represent a data item to be processed, helps the students to learn many other topics of engineering and help for a lifelong learning.
CST 201 CO3-PSO1	H	By learning to write an algorithm to find the solution of a computational problem by selecting an appropriate non-linear data structure to represent a data item to be processed, helps the students to analyze, design and develop computing solutions.
CST 201 CO3-PSO3	H	By learning to write an algorithm to find the solution of a computational problem by selecting an appropriate non-linear data structure to represent a data item to be processed, helps the students to adapt to modern information and communication technologies

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CST 201 CO4-PO1	H	By learning to store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set, help the students to solve complex engineering problems
CST 201 CO4-PO2	**H**	By learning to store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set, helps the students to identify and formulate complex engineering problems
CST 201 CO4-PO3	H	By learning to store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set, helps the students to design solutions to complex engineering problems
CST 201 CO4-PO4	L	By learning to store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set, helps the students to analyze and interpret data.
CST 201 CO4-PO6	**L**	By learning to store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set, help to solve health, safety and legal servicing problems efficiently
CS 205 CO4-PO12	H	By learning to store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set helps to learn many other topics of engineering and help for a lifelong learning.
CST 201 CO4-PSO1	H	By learning to store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set , helps the students to analyze, design and develop solutions to different computing problems.
CST 201 CO4-PSO3	H	By learning to store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set can be used to help to adapt to modern information and communication technologies
CST 201 CO5-PO1	**M**	By learning to select appropriate sorting algorithms to be used in specific circumstances, students will be able to solve complex engineering problems
CST 201 CO5-PO2	M	By learning to select appropriate sorting algorithms to be used in specific circumstances, students will be able to identify and formulate complex engineering problems
CST 201 CO5-PO3	**M**	By learning to select appropriate sorting algorithms to be used in specific circumstances, students will be able to design solutions to complex engineering problems

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CST 201 CO5-PO4	L	By learning to select appropriate sorting algorithms to be used in specific circumstances, the students will be able to conduct investigation on large set of data to analyze the performance on different set of data
CST 201 CO5-PO6	**L**	By learning to select appropriate sorting algorithms to be used in specific circumstances helps to solve health, safety and legal servicing problems efficiently
CST 201 CO5-PO12	H	By learning to select appropriate sorting algorithms to be used in specific circumstances helps to learn many other topics of engineering and help for a lifelong learning.
CST 201 CO5-PSO1	H	By learning to select appropriate sorting algorithms to be used in specific circumstances, the students will be able to analyze, design and develop solutions to complex engineering problems.
CST 201 CO5-PSO3	H	By learning to select appropriate sorting algorithms to be used in specific circumstances, the students will be able to use modern information and communication technologies
CST 201 CO6-PO1	**H**	Learning to design and implement Data Structures for solving real world problems efficiently, helps to find solutions for various complex engineering problems.
CST 201 CO6-PO2	**H**	Learning to design and implement Data Structures for solving real world problems efficiently, helps to find identify and formulate solutions for various complex engineering problems.
CST 201 CO6-PO3	**H**	Learning to design and implement Data Structures for solving real world problems efficiently, helps to design solutions for various complex engineering problems.
CST 201 CO6-PO4	**M**	Learning to design and implement Data Structures for solving real world problems efficiently, helps to conduct investigation on large set of data to analyze the performance on different set of data
CST 201 CO6-PO6	**L**	Learning to design and implement Data Structures for solving real world problems efficiently help to solve health, safety and legal servicing problems efficiently
CS 205 CO6-PO12	H	Learning to design and implement Data Structures for solving real world problems efficiently helps to learn many other topics of engineering and help for a lifelong learning.

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CS 205 CO6-PSO1	H	Learning to design and implement Data Structures for solving real world problems efficiently help in designing solutions to complex multidisciplinary engineering problems.
CS 205 CO6-PSO3	H	Learning to design and implement Data Structures for solving real world problems efficiently help to adapt to modern information and communication technologies

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Programme : Bachelor of Technology | Course Code: CSL201

Course Name: DATA STRUCTURES LAB | Semester: 6

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CSL201.CO1	Write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements (Cognitive Knowledge Level: Analyse)	K4
CSL201.CO2	Write a time/space efficient program to sort a list of records based on a given key in the record (Cognitive Knowledge Level: Apply)	K3
CSL201.CO3	Examine a given Data Structure to determine its space complexity and time complexities of operations on it (Cognitive Knowledge Level: Apply)	K3
CSL201.CO4	Design and implement an efficient data structure to represent given data (Cognitive Knowledge Level: Apply)	K3
CSL201.CO5	Write a time/space efficient program to convert an arithmetic expression from one notation to another (Cognitive Knowledge Level: Apply)	K3
CSL201.CO6	Write a program using linked lists to simulate Memory Allocation and Garbage Collection (Cognitive Knowledge Level: Apply)	K3

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSL201.CO1	3	3	3	2	-	1	-	2	-	2	-	3	3	-	3
CSL201.CO2	3	3	3	2	-	-	-	2	-	2	-	3	3	-	3
CSL201.CO3	3	3	3	2	-	-	-	2	-	2	-	3	3	-	3
CSL201.CO4	3	3	3	2	-	-	-	2	-	2	-	3	3	-	3
CSL201.CO5	3	3	3	-	-	-	-	2	-	2	-	3	3	-	-
CSL201.CO6	3	3	3	-	-	-	-	2	-	2	-	3	3	-	-
AVG	3	3	3	2	-	1	-	2	-	2	-	3	3	-	3

Correlation : 1-Low, 2-moderate, 3-high, No Correlation '-'

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JUSTIFICATION

CO-PO	LEVEL (Low/ Moderate/ High)	JUSTIFICATION
CSL201.CO1 – PO1	**HIGH**	By learning to write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements, the students will be able to solve complex engineering problems.
CSL201.CO2– PO1	**HIGH**	By learning to write a time/space efficient program to sort a list of records based on a given key in the record, the students will be able to solve complex engineering problems.
CSL201.CO3– PO1	**HIGH**	By examining a given Data Structure to determine its space complexity and time complexities of operations on it, the students will be able to solve complex engineering problems.
CSL201.CO4– PO1	**HIGH**	By designing and implement an efficient data structure to represent given data, the students will be able to solve complex engineering problems.
CSL201.CO5– PO1	**HIGH**	By writing a time/space efficient program to convert an arithmetic expression from one notation to another, the students will be able to solve complex engineering problems.
CSL201.CO6– PO1	**HIGH**	By writing a program using linked lists to simulate Memory Allocation and Garbage Collection, the students will be able to solve complex engineering problems.
CSL201.CO1 – PO2	**HIGH**	By learning to write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements, the students will be able to identify and formulate complex engineering problems.
CSL201.CO2– PO2	**HIGH**	By learning to write a time/space efficient program to sort a list of records based on a given key in the record, the students will be able to identify and formulate complex engineering problems.

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CSL201.CO3– PO2	**HIGH**	By examining a given Data Structure to determine its space complexity and time complexities of operations on it the students will be able to identify and formulate complex engineering problems.
CSL201.CO4– PO2	**HIGH**	By designing and implement an efficient data structure to represent given data, the students will be able to identify and formulate complex engineering problems.
CSL201.CO5– PO2	**HIGH**	By writing a time/space efficient program to convert an arithmetic expression from one notation to another, the students will be able to the students will be able to identify and formulate complex engineering problems.
CSL201.CO6– PO2	**HIGH**	By writing a program using linked lists to simulate Memory Allocation and Garbage Collection, the students will be able to identify and formulate complex engineering problems.
CSL201.CO1 – PO3	**HIGH**	By learning to write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements, the students will be able to design solutions for complex engineering problems.
CSL201.CO2– PO3	**HIGH**	By learning to write a time/space efficient program to sort a list of records based on a given key in the record, the students will be able to the students will be able to design solutions for complex engineering problems.
CSL201.CO3– PO3	**HIGH**	By examining a given Data Structure to determine its space complexity and time complexities of operations on it, the students will be able to the students will be able design solutions for complex engineering problems.
CSL201.CO4– PO3	**HIGH**	By designing and implement an efficient data structure to represent given data, the students will be able to design solutions for complex engineering problems.
CSL201.CO5– PO3	**HIGH**	By writing a time/space efficient program to convert an arithmetic expression from one notation to another, the students will be able to design solutions for complex engineering problems.
CSL201.CO6– PO3	**HIGH**	By writing a program using linked lists to simulate Memory Allocation and Garbage Collection, to the students will be able to design solutions for complex engineering problems.

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CSL201.CO1 – PO4	**MODERATE**	By learning to write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements, the students will be able to use research-based knowledge to provide valid conclusions.
CSL201.CO2– PO4	**MODERATE**	By learning to write a time/space efficient program to sort a list of records based on a given key in the record, the students will be able to use research-based knowledge to provide valid conclusions.
CSL201.CO3– PO4	**MODERATE**	By examining a given Data Structure to determine its space complexity and time complexities of operations on it the students will be able to use research-based knowledge to provide valid conclusions.
CSL201.CO4– PO4	**MODERATE**	By designing and implement an efficient data structure to represent given data, the students will be able to use research-based knowledge to provide valid conclusions.
CSL201.CO1 – PO6	**LOW**	By learning to write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements, the students will be able to apply reasoning to assess issues in different areas of life.
CSL201.CO1 – PO8	**MODERATE**	By learning to write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements, the students will be able to apply ethical principles while doing programs.
CSL201.CO2– PO8	**MODERATE**	By learning to write a time/space efficient program to sort a list of records based on a given key in the record, the students will be able to apply ethical principles while doing programs.
CSL201.CO3– PO8	**MODERATE**	By examining a given Data Structure to determine its space complexity and time complexities of operations on it the the students will be able to apply ethical principles while doing programs.
CSL201.CO4– PO8	**MODERATE**	By designing and implement an efficient data structure to represent given data, the students will be able to apply ethical principles while doing programs.
CSL201.CO5– PO8	**MODERATE**	By writing a time/space efficient program to convert an arithmetic expression from one notation to another, the students will be able to the students will be able to apply ethical principles while doing programs.

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CSL201.CO6– PO8	**MODERATE**	By writing a program using linked lists to simulate Memory Allocation and Garbage Collection, the students will be able to apply ethical principles while doing programs.
CSL201.CO1 – PO10	**MODERATE**	By learning to write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements, the students will be able to communicate effectively on complex engineering problems.
CSL201.CO2– PO10	**MODERATE**	By learning to write a time/space efficient program to sort a list of records based on a given key in the record, the students will be able to the students will be able to communicate effectively on complex engineering problems
CSL201.CO3– PO10	**MODERATE**	By examining a given Data Structure to determine its space complexity and time complexities of operations on it, the students will be able to communicate effectively on complex engineering problems
CSL201.CO4– PO10	**MODERATE**	By designing and implement an efficient data structure to represent given data, the students will be able to communicate effectively on complex engineering problems
CSL201.CO5– PO10	**MODERATE**	By writing a time/space efficient program to convert an arithmetic expression from one notation to another, the students will be able to communicate effectively on complex engineering problems
CSL201.CO6– PO10	**MODERATE**	By writing a program using linked lists to simulate Memory Allocation and Garbage Collection, the students will be able to communicate effectively on complex engineering problems
CSL201.CO1 – PO12	**HIGH**	By learning to write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements, the students will be able to engage in continuous learning.
CSL201.CO2– PO12	**HIGH**	By learning to write a time/space efficient program to sort a list of records based on a given key in the record, the students will be able to engage in continuous learning.
CSL201.CO3– PO12	**HIGH**	By examining a given Data Structure to determine its space complexity and time complexities of operations on it the students will be able to engage in continuous learning.

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CSL201.CO4– PO12	**HIGH**	By designing and implement an efficient data structure to represent given data, the students will be able to engage in continuous learning.
CSL201.CO5– PO12	**HIGH**	By writing a time/space efficient program to convert an arithmetic expression from one notation to another, the students will be able to engage in continuous learning.
CSL201.CO6– PO12	**HIGH**	By writing a program using linked lists to simulate Memory Allocation and Garbage Collection, the students will be able to engage in continuous learning.
CSL201.CO1 – PSO1	**HIGH**	By learning to write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements, the students will be able to analyze, design and develop computing solutions by applying foundational concepts of computer science and engineering.
CSL201.CO2– PSO1	**HIGH**	By learning to write a time/space efficient program to sort a list of records based on a given key in the record, the students will be able to analyze, design and develop computing solutions by applying foundational concepts of computer science and engineering.
CSL201.CO3– PSO1	**HIGH**	By examining a given Data Structure to determine its space complexity and time complexities of operations on it the students will be able to analyze, design and develop computing solutions by applying foundational concepts of computer science and engineering.
CSL201.CO4– PSO1	**HIGH**	By designing and implement an efficient data structure to represent given data, the students will be able to analyze, design and develop computing solutions by applying foundational concepts of computer science and engineering.
CSL201.CO5– PSO1	**HIGH**	By writing a time/space efficient program to convert an arithmetic expression from one notation to another, the students will be able to analyze, design and develop computing solutions by applying foundational concepts of computer science and engineering.
CSL201.CO6– PSO1	**HIGH**	By writing a program using linked lists to simulate Memory Allocation and Garbage Collection, the students will be able to analyze, design and develop computing solutions by applying foundational concepts of computer science and engineering.

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CSL201.CO1 – PSO3	**HIGH**	By learning to write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements, the students will be able to adapt to emerging information and communication technologies.
CSL201.CO2– PSO3	**HIGH**	By learning to write a time/space efficient program to sort a list of records based on a given key in the record, the students will be able to adapt to emerging information and communication technologies.
CSL201.CO3– PSO3	**HIGH**	By examining a given Data Structure to determine its space complexity and time complexities of operations on it the students will be able to adapt to emerging information and communication technologies.
CSL201.CO4– PSO3	**HIGH**	By designing and implement an efficient data structure to represent given data, the students will be able to adapt to emerging information and communication technologies.

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Programme: Bachelor of Technology Course Code: CST205
Course Name: Object Oriented Programming using Java Semester: 3

COURSE OUTCOMES

After the completion of the course the student will be able to

CO	Statement
CST205.1	Write Java programs using the object oriented concepts - classes, objects, constructors, data hiding, inheritance and polymorphism (Cognitive Knowledge Level: Apply)
CST205.2	Utilize datatypes, operators, control statements, built in packages & interfaces, Input/ Output Streams and Files in Java to develop programs (Cognitive Knowledge Level: Apply)
CST205.3	Illustrate how robust programs can be written in Java using exception handling mechanism (Cognitive Knowledge Level: Understand)
CST205.4	Write application programs in Java using multithreading and database connectivity (Cognitive Knowledge Level: Apply)
CST205.5	Write Graphical User Interface based application programs by utilising event handling features and Swing in Java (Cognitive Knowledge Level: Apply)
CST205.6	Apply the knowledge of software engineering methods, such as object oriented analysis and design methods with a clear emphasis on UML. (Cognitive Knowledge Level: Apply)

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CST205.1	1	2	2	1	-	-	-	-	-	-	-	3	3	-	-
CST205.2	1	2	2	1	-	-	-	-	-	-	-	3	3	-	-
CST205.3	1	1	2	1	-	-	-	-	-	1		3	1	-	-
CST205.4	2	2	3	1	-	-	-	-	-	-	-	3	3	1	-
CST205.5	2	2	3	1								3	3	3	
CST205.6	1	2	3	1								3	3	3	1
AVG	1.33	1.83	2.5	1						1		3	2.67	2.33	1

Correlation : 1-Low, 2-moderate, 3-high, No Correlation '-'

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JUSTIFICATION

Mapping	Level (L/M/H)	Justification
CST205.1-PO1	L	By understanding the object oriented features of java, the students will be able to apply the knowledge in java to derive solutions to basic computing problems.
CST205.1-PO2	M	By gaining the ability to apply object oriented principles in software design process, the students will be able to analyze various engineering problems in the domain of software development with better effectiveness.
CST205.1-PO3	M	The students will get an insight into software design process and they would be able to apply standard practices in software project development to an extent
CST205.1-PO4	L	Java programming helps in finding solutions for complex engineering problems, but more training would be required to develop the ability
CST205.1-PO12	H	The knowledge of Object oriented concepts learned in this course will help the students during their career.
CO405.1-PSO1	H	Students will be able to apply the foundational concepts in objected oriented deign to develop computing solutions in the real world problems.
CST205.2 – PO1	L	By understanding lexical issues and basic programing constructs of java, the students will be able to derive solutions to computing problems
CST205.2-PO2	M	Students will be able to analyse basic problems and implement solutions using lexical issues and programing constructs of java.
CST205.2-PO3	M	By understanding lexical issues and programing constructs of java, the students will be able to design/develop solutions to basic problems
CST205.2-PO4	L	By understanding java features like inheritance, packages and interface, the students will be able to find solutions for complex

		engineering problems, but more training would be required to develop the ability
CST205.2-PO12	H	The knowledge of basic programing concepts learned in this course will help the students during their career.
CST205.2-PSO1	H	Students will be able to apply the foundational concepts in java to develop computing solutions in the real world problems.
CST205.3-PO1	L	Students will be able to apply the knowledge of exception handing to handle errors in the programs.
CST205.3-PO2	L	Students will be able to analyse the errors in the program by exception handling techniques.
CST205.3-PO3	M	Exception handling will help the students to design reliable and quality software solutions.
CST205.3-PO4	L	Students will investigate on the possibilities of the errors and find reliable solutions using exception handling techniques.
CST205.3-PO10	L	The reasons for the exceptions will be effectively communicated to the user.
CST205.3-PO12	H	Students will be able to develop Robust solutions in their career
CST205.3-PSO1	L	Students will be able to apply the exception handling techniques in java to develop error free computing solutions in the real world problems.
CST205.4-PO1	M	Students will be able to apply the knowledge of multi-threading and JDBC concepts to solve complex software problems, but require more training in advanced Java .
CST205.4-PO2	M	Students will be able to analyse complex problems to some extend and implement it by using the concepts of multi-threading and JDBC.
CST205.4-PO3	H	Students will be able to design and develop problems using multi-threading and JDBC concepts in Java.
CST205.4-PO4	L	Innovative products can be developed by conducting investigations on real world problems.

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CST205.4-PO12	H	The knowledge of advanced concepts in this course will help the students in their lifelong learning .
CST205.4-PSO1	H	Multi-threading and JDBC techniques in java helps the students to design, develop and analyse computing solutions in the real world problems.
CST205.4-PSO2	H	During the development of solutions, the students can apply best software engineering practices.
CST205.6 – PO1	L	Students will be able to apply the knowledge of UML to design solutions to software problems.
CST205.6 – PO2	M	A software design document can be analysed by a student using the UML diagrams.
CST205.6 – PO3	H	Students will be able to develop solutions for problems by UML design concepts.
CST205.6 – PO4	L	Investigations on UML diagrams to analyse the underlying concepts in the problems presented.
CST205.6–PSO1	H	UML diagrams techniques in Object oriented programing helps the students to design, develop and analyse computing solutions in the real world problems.
CST205.6–PSO2	H	During the designing of UML diagrams, the students can apply best software engineering practices.
CST205.6–PSO3	L	The students can use emerging technologies to design innovative UML diagrams.

Department of Computer Science and Engineering

Programme: Bachelor of Technology Course Code: CSL 203
Course Name: Object Oriented Programming Lab (in Java) Semester: 3

COURSE OUTCOMES

After the completion of the course the student will be able to

CO	Statement
CSL203.1	Implement the Object Oriented concepts - constructors, inheritance, method overloading & overriding and polymorphism in Java (Cognitive Knowledge Level: Apply)
CSL203.2	Implement programs in Java which use datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and Files (Cognitive Knowledge Level: Apply)
CSL203.3	Implement robust application programs in Java using exception handling (Cognitive Knowledge Level: Apply)
CSL203.4	Implement application programs in Java using multithreading and database connectivity (Cognitive Knowledge Level: Apply)
CSL203.5	Implement Graphical User Interface based application programs by utilizing event handling features and Swing in Java (Cognitive Knowledge Level: Apply)

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSL203.1	3	3	3	3	3	-	-	1	-	3	-	3	3	1	3
CSL203.2	3	3	3	3	3	-	-	1	-	3	-	3	3	1	3
CSL203.3	3	3	3	3	3	-	-	1	-	3	-	3	3	1	3
CSL203.4	3	3	3	3	3	-	-	1	-	3	-	3	3	2	3
CSL203.5	3	3	3	3	3	-	-	1	-	3	-	3	3	1	3
AVG	3	3	3	3	3	-	-	1	-	3	-	3	3	1.2	3

Correlation: 1-Low, 2-moderate, 3-high, No Correlation '-'

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JUSTIFICATION

Mapping	Low/Medium/ High	Justification
CSL203.1-PO1	H	By Implementing the Object Oriented concepts such as constructors, inheritance, method overloading & overriding and polymorphism in Java students are able to apply the knowledge gained for the solutions of complex engineering problems.
CSL203.1-PO2	H	With the knowledge of Object Oriented concepts such as constructors, inheritance, method overloading & overriding and polymorphism in Java, students are able to identify and analyse the complex engineering problems.
CSL203.1-PO3	H	With the knowledge of Object Oriented concepts such as constructors, inheritance, method overloading & overriding and polymorphism in Java, the students are able to design solutions for complex engineering problems that meet the specified needs.
CSL203.1-PO4	H	With the knowledge of Object Oriented concepts such as constructors, inheritance, method overloading & overriding and polymorphism in Java, the students are able to conduct investigations of complex problems.
CSL203.1-PO5	H	With the knowledge of Object Oriented concepts such as constructors, inheritance, method overloading & overriding and polymorphism in Java, the students are able to apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
CSL203.1-PO8	L	With the design of experiments the students are able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
CSL203.1-PO10	H	With the knowledge of Object Oriented concepts such as constructors, inheritance, method overloading & overriding and polymorphism in Java, the students are able to communicate effectively on complex engineering activities with engineering community, able to comprehend effectively give and receive clear instructions
CSL203.1-PO12	H	With the knowledge of Object Oriented concepts such as constructors, inheritance, method overloading & overriding and polymorphism in Java, the students are able to communicate effectively on complex engineering activities with engineering community, able to recognize the need for, and life-long learning in the broadest context of technological change.
CSL203.1-PSO1	H	Students will be able to analyse, design and develop computing solutions with the knowledge of Object Oriented concepts such as constructors, inheritance, method overloading & overriding and polymorphism in Java

CSL203.1-PSO2	L	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge of Object Oriented concepts such as constructors, inheritance, method overloading & overriding and polymorphism in Java
CSL203.1-PSO3	H	Students will be able to adapt to the emerging information and communication technologies by providing innovative ideas and ideas to novel problems with the gained knowledge of Object Oriented concepts such as constructors, inheritance, method overloading & overriding and polymorphism in Java
CSL203.2-PO1	H	By Implementing the programs in Java which uses the datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and files students are able to apply the knowledge gained for the solutions of complex engineering problems.
CSL203.2-PO2	H	With the knowledge gained from the programs in Java which uses the datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and files, students are able to identify and analyse the complex engineering problems.
CSL203.2-PO3	H	With the knowledge of the programs in Java which uses the datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and files, the students are able to design solutions for complex engineering problems that meet the specified needs.
CSL203.2-PO4	H	With the knowledge of the programs in Java which uses the datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and files, the students are able to conduct investigations of complex problems.
CSL203.2-PO5	H	With the knowledge of the programs in Java which uses the datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and files, the students are able to apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
CSL203.2-PO8	L	With the design of programs the students are able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

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CSL203.2-PO10	H	With the knowledge of the programs in Java which uses the datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and files, the students are able to communicate effectively on complex engineering activities with engineering community, able to comprehend effectively give and receive clear instructions

CSL203.2-PO12	H	With the knowledge of the programs in Java which uses the datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and files, the students are able to communicate effectively on complex engineering activities with engineering community, able to recognize the need for, and life-long learning in the broadest context of technological change.
CSL203.2-PSO1	H	Students will be able to analyse, design and develop computing solutions with the knowledge of the programs in Java which uses the datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and files.
CSL203.2-PSO2	L	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge of the programs in Java which uses the datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and files.
CSL203.2-PSO3	H	Students will be able to adapt to the emerging information and communication technologies by providing innovative ideas and ideas to novel problems with the gained knowledge of the programs in Java which uses the datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and files
CSL203.3-PO1	H	By Implementing the robust application programs in Java using exception handling, students are able to apply the knowledge gained for the solutions of complex engineering problems.
CSL203.3-PO2	H	With the knowledge gained from the robust application programs in Java using exception handling, students are able to identify and analyse the complex engineering problems.
CSL203.3-PO3	H	With the knowledge of the robust application programs in Java using exception handling, the students are able to design solutions for complex engineering problems that meet the specified needs.
CSL203.3-PO4	H	With the knowledge of the robust application programs in Java using exception handling, the students are able to conduct investigations of complex problems.

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CSL203.3-PO5	H	With the knowledge of the robust application programs in Java using exception handling, the students are able to apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
CSL203.3-PO8	H	With the design of robust application programs the students are able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
CSL203.3-PO10	H	With the knowledge of the robust application programs in Java using exception handling, the students are able to communicate effectively on complex engineering activities with engineering community, able to comprehend effectively give and receive clear instructions

CSL203.3-PO12	H	With the knowledge of the robust application programs in Java using exception handling, the students are able to communicate effectively on complex engineering activities with engineering community, able to recognize the need for, and life-long learning in the broadest context of technological change.
CSL203.3-PSO1	H	Students will be able to analyse, design and develop computing solutions with the robust application programs in Java using exception handling.
CSL203.3-PSO2	L	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge of the robust application programs in Java using exception handling.
CSL203.3-PSO3	H	Students will be able to adapt to the emerging information and communication technologies by providing innovative ideas and ideas to novel problems with the gained knowledge of the robust application programs in Java using exception handling.
CSL203.4-PO1	H	By Implementing the application programs in Java using multithreading and database connectivity, students are able to apply the knowledge gained for the solutions of complex engineering problems.
CSL203.4-PO2	H	With the knowledge gained from the application programs in Java using multithreading and database connectivity, students are able to identify and analyse the complex engineering problems.
CSL203.4-PO3	H	With the knowledge of the application programs in Java using multithreading and database connectivity, the students are able to design solutions for complex engineering problems that meet the specified needs.
CSL203.4-PO4	H	With the knowledge of the application programs in Java using multithreading and database connectivity, the students are able to conduct investigations of complex problems.
CSL203.4-PO5	H	With the knowledge of the application programs in Java using multithreading and database connectivity, the students are able to apply appropriate

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		techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
CSL203.4-PO8	L	With the design of application programs the students are able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
CSL203.4-PO10	H	With the knowledge of the application programs in Java using multithreading and database connectivity, the students are able to communicate effectively on complex engineering activities with engineering community, able to comprehend effectively give and receive clear instructions
CSL203.4-PO12	H	With the knowledge of the application programs in Java using multithreading and database connectivity, the students are able to communicate effectively on complex engineering activities with engineering community, able to recognize the need for, and life-long learning in the broadest context of technological change.
CSL203.4-PSO1	H	Students will be able to analyse, design and develop computing solutions with the knowledge of the application programs in Java using multithreading and database connectivity.
CSL203.4-PSO2	M	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge of the application programs in Java using multithreading and database connectivity.
CSL203.4-PSO3	H	Students will be able to adapt to the emerging information and communication technologies by providing innovative ideas and ideas to novel problems with the gained knowledge of the application programs in Java using multithreading and database connectivity.
CSL203.5-PO1	H	By Implementing the Graphical User Interface based application programs by utilizing event handling features and Swing in Java students are able to apply the knowledge gained for the solutions of complex engineering problems.
CSL203.5-PO2	H	With the knowledge gained from the Graphical User Interface based application programs by utilizing event handling features and Swing in Java, students are able to identify and analyse the complex engineering problems.
CSL203.5-PO3	H	With the knowledge of the Graphical User Interface based application programs by utilizing event handling features and Swing in Java, the students are able to design solutions for complex engineering problems that meet the specified needs.
CSL203.5-PO4	H	With the knowledge of the Graphical User Interface based application programs by utilizing event handling features and Swing in Java, the students are able to conduct investigations of complex problems.
CSL203.5-PO5	H	With the knowledge of the Graphical User Interface based application programs by utilizing event handling features and Swing in Java, the students

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		are able to apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
CSL203.5-PO8	H	With the design of Graphical user Interface based programs, the students are able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
CSL203.5-PO10	H	With the knowledge of the Graphical User Interface based application programs by utilizing event handling features and Swing in Java, the students are able to communicate effectively on complex engineering activities with engineering community, able to comprehend effectively give and receive clear instructions
CSL203.5-PO12	H	With the knowledge of the Graphical User Interface based application programs by utilizing event handling features and Swing in Java, the students are able to communicate effectively on complex engineering activities with engineering community, able to recognize the need for, and life-long learning in the broadest context of technological change.

CSL203.5-PSO1	H	Students will be able to analyse, design and develop computing solutions with the knowledge of the Graphical User Interface based application programs by utilizing event handling features and Swing in Java.
CSL203.5-PSO2	L	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge of the Graphical User Interface based application programs by utilizing event handling features and Swing in Java
CSL203.5-PSO3	H	Students will be able to adapt to the emerging information and communication technologies by providing innovative ideas and ideas to novel problems with the gained knowledge of the Graphical User Interface based application programs by utilizing event handling features and Swing in Java

SEMESTER 4

Programme: Bachelor of Technology Course Code: CST 202

Course Name: Computer Organization And Architecture Semester: 4

COURSE OUTCOMES

After the completion of the course the student will be able to

CO	Statement	K LEVEL
CO1	Recognize and express the relevance of basic components,I/O organization and pipelining schemes in a digital computer(Cognitive Knowledge Level:Understand)	K2
CO2	Explain the types of memory systems and mapping functions used in memory systems.(Cognitive Knowledge Level:Understand)	K2
CO3	Demonstrate the control signalsrequire for the execution of a given instruction.(Cognitive Knowledge Level:Apply)	K3
CO4	Illustrate the design of a Arithmetic Logic Unitand explain the usage of registers in it.(Cognitive Knowledge Level:Apply)	K3
CO5	Explain the implementaion aspects of a arithmetic algorithms in a digital computer.(Cognitive Knowledge Level:Apply)	K3
CO6	Develop the control logic for a given arithmetic problem.(Cognitive Knowledge Level:Apply)	K3

CO-PO-PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	-	-	-	-	-	-	-	3	2	1	-
CO2	3	3	2	1	-	-	-	-	-	1	-	3	3	2	-
CO3	3	3	3	1	-	-	-	-	-	1	-	3	3	1	-
CO4	3	3	3	1	-	-	-	-	-	1	-	3	3	2	2
CO5	3	3	3	-	-	-	-	-	-	1	-	3	3	2	-
CO6	3	2	2	1	-	-	-	-	-	1	-	3	2	-	2
Average	3	3	3	1	-	-	-	-	-	1	-	3	3	2	2

Correlation High:3 Medium :2 Low:1 No correlation: -

JUSTIFICATION

MAPPING	LOW/MEDIUM /HIGH	JUSTIFICATION
CST202.CO1-PO1	H	Students have ability to apply the knowledge of engineering fundamentals to identify the basic structure and functional units of a digital computer and for the development of supporting software and applications.
CST202.CO1-PO2	M	Students are able to identify the basic structure and functional units of a digital computer and also they can analyse the units of a digital computer.
CST202.CO1-PO3	M	Students are able to apply reasoning informed by the contextual knowledge to assess the functions and structure of functional units of a digital computer using engineering science.
CST202.CO1-PO4	M	Students can communicate effectively by presenting the functionalities of a digital computer.
CST202.CO1 - PO12	H	Students can recognize the need for the digital computer and gain the ability to engage in independent and lifelong learning in the functionalities of a digital computer.
CST202.CO1- PSO1	M	Students can develop computing solutions in functionality of a digital computer by applying foundational concepts of Computer Science and Engineering.
CST202.CO1- PSO2	L	Students are able to apply reasoning informed by the contextual knowledge to assess the functions and structure of functional units of a digital computer.
CST202.CO2- PO1	H	Students have ability to apply the knowledge of engineering fundamentals to relate the effect of addressing modes and identify the role of various functional units of a computer.
CST202.CO2- PO2	H	Students are able to formulate the effect of addressing modes and identify the role of various functional units of a computer using engineering science.
CST202.CO2- PO3	M	Students are able to find solutions to meet specific needs in the effect of addressing modes.

CST202.CO2- PO4	L	Students can experiment and analyse data to relate the effect of addressing modes and identify the role of various functional units of a computer.
CST202.CO2- PO10	L	Students are able to apply reasoning informed by the contextual knowledge to relate the effect of addressing modes and identify the role of various functional units of a computer.
CST202.CO2- PO12	H	Students can communicate effectively by presenting the effect of addressing modes and the role of various functional units of a computer.
CST202.CO2- PSO1	H	Students can develop computing solutions to relate the effect of addressing modes by applying foundational concepts of Computer Science and Engineering.
CST202.CO2- PSO2	M	Students can adapt to emerging information in functional units of a computer by providing innovative ideas and solutions to problems in functional units of a digital computer.
CST202.CO3- PO1	H	Students have ability to apply the knowledge of engineering fundamentals to design processing unit using the concepts of ALU and control logic design.
CST202.CO3- PO2	H	Students are able to formulate and design basic structure processing unit using the concepts of ALU and control logic design using engineering science
CST202.CO3- PO3	H	Students can adapt to emerging information in designing processing unit by providing innovative ideas and solutions to problems in ALU and control logic design.
CST202.CO3- PO4	L	Students can experiment and analyse data to relate the ALU and control logic
CST202.CO3- PO10	L	Students are able to apply reasoning informed by the contextual knowledge to design the basic structure of processing unit using the concepts of ALU and control logic design.
CST202.CO3- PO12	H	Students are able to apply ethical principles while designing the basic structure of processing unit using the concepts of ALU.
CST202.CO3- PSO1	H	Students can communicate effectively while designing the basic structure of processing unit using the concepts of ALU.

CST202.CO3-PS02	L	Students can recognize the need for designing processing unit using the concepts of ALU and control logic design via lifelong learning.
CST202.CO4-PO1	H	Students have ability to apply the knowledge of engineering fundamentals to identify the features of various types of memory unit and identify pros and cons of different types of control logic design in processors.
CST202.CO4-PO2	H	Students are able to identify the features of various types of memory unit and identify pros and cons of different types of control logic design in processors using engineering science.
CST202.CO4-PO3	H	Students can adapt to emerging information in the identifying the features of various types of memory unit and identify pros and cons of different types of control logic design in processors using engineering science.
CST202.CO4-PO4	L	Students can experiment and analyse the features of various types of memory unit and identify pros and cons of different types of control logic design in processors using engineering science and synthesis information.
CST202.CO4-PO10	L	Students are able to identify the features of various types of memory unit and identify pros and cons of different types of control logic design in processors.
CS202.CO4-PO12	H	Students can communicate effectively while identifying the features of various types of memory unit and identifying pros and cons of different types of control logic design in processors.
CS202.CO4-PSO1	H	Students can recognize the need of various types of memory unit and lifelong learning in the context of technological change.
CST202.CO4-PSO2	M	Students can develop computing solutions in while identifying the features of various types of memory unit and identifying pros and cons of different types of control logic design in processors by applying foundational concepts of Computer Science and Engineering.
CS202.CO4-PSO3	M	Students can apply software engineering principles while identifying the features of various types of memory unit and identifying pros and cons of different types of control logic design in processors
CST202.CO5-PO1	H	Students have ability to apply the knowledge of engineering fundamentals to outline appropriate interfacing standards for I/O devices.

CST202.CO5-PO2	H	Students are able to apply the knowledge of engineering fundamentals to outline appropriate interfacing standards for I/O devices using engineering science
CST202.CO5-PO3	H	Students can adapt to apply the knowledge of engineering fundamentals to outline appropriate interfacing standards for I/O device
CST202.CO5-PO10	L	Students can experiment and appropriate interfacing standards for I/O devices and synthesis information.
CST202.CO5-PO12	H	Students are able to apply reasoning informed by the contextual knowledge to outline appropriate interfacing standards for I/O devices.
CST202.CO5-PSO1	H	Students can communicate effectively while defining appropriate interfacing standards for I/O devices
CST202.CO5-PSO2	M	Students can recognize appropriate interfacing standards for I/O devices and lifelong learning in the context of technological change.
CST202.CO6-PO1	H	Students can adapt to emerging information in designing processing unit by providing innovative ideas and solutions to problems in ALU.
CST202.CO6-PO2	M	Students are able to apply ethical principles while designing the basic structure of processing unit using the concepts of ALU
CST202.CO6-PO3	M	Students can recognize the need for designing processing unit using the concepts of ALU and control logic design via lifelong learning.
CST202.CO6-PO4	L	Students are able to apply principles while designing the basic structure of processing unit using the concepts of ALU
CST202.CO6-PO10	L	Students can adapt to emerging information in functional units of a computer by providing innovative ideas and solutions to problems in functional units of a digital computer.
CST202.CO6-PO12	H	Students can adapt to emerging information in designing processing unit by providing innovative ideas to problems in ALU.
CST202.CO6-PSO1	M	Students can communicate effectively while designing the basic structure of processing unit using the concepts arithmetic circuits.
CST202.CO6-PSO3	M	Students have ability to apply the knowledge of engineering fundamentals to design processing unit.

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Name List of Students

Course : B.Tech Course Code : CST 204

Course Name : Database Management Systems Year & Semester : 2nd Year, 4

Academic Year: 2021-2022

Course Outcome

CO	Description	Bloom's taxonomy level
CO1	Summarize and exemplify fundamental nature and characteristics of database systems	Understanding(U)
CO2	Model real word scenarios given as informal descriptions, using Entity Relationship diagrams.	Applying(P)
CO3	Model and design solutions for efficiently representing and querying data using relational model	Analyzing(A)
CO4	Demonstrate the features of indexing and hashing in database applications	Applying(P)
CO5	Discuss and compare the aspects of Concurrency Control and Recovery in Database systems	Applying(P)
CO6	Explain various types of NoSQL databases	Understanding(U)

CO - PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1									1	1		
CO2	2	3	3	2								3	3	3	3
CO3	2	3	3	2								3	3	3	3
CO4	2	3	3							1		3	3	3	3
CO5	2	3	3							1		3	3	3	3
CO6	1	1	1		2					1		3	1	3	1

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Mapping	LOW/MEDIUM/HIGH	Justification
CST 204.1-PO1	**L**	As students could just identify fundamental nature and characteristics of database system.
CST 204.1-PO2	**L**	Students could only analyse fundamental nature and characteristics of database system.
CST 204.1-PO3	**L**	Students could have only the basic knowledge of fundamental nature and characteristics of database system.
CST 204.1-PO12	**L**	The basics characteristics of database system will help the students to learn database further.
CST 204.1-PSO1	**L**	As students could just identify fundamental nature and characteristics of database system.
CST 204.2-P01	**M**	Students will be able to apply knowledge in DBMS to recognise ER diagram.
CST 204.2-PO2	**H**	Students will be able to analyse ER Diagram.
CST 204.2-PO3	**H**	Students will be able to design ER diagram from real world scenarios.
CST 204.2-PO4	**M**	Students will be able to conduct investigations on ER diagram and summarise the meaning from it.at a moderate level.
CST 204.2-PO12	**H**	The knowledge in ER diagram will help the students to design database applications in all future projects.
CST 204.2-PSO1	**H**	Students will be able to analyse and design ER diagram by applying the fundamental concepts.
CST 204.2-PSO2	**H**	Students will be able to apply software engineering principles in development of ER diagrams.
CST 204.2-PSO3	**H**	Students can solve the database design problems by using ER diagram.
CST 204.3-PO1	**M**	Knowledge in Relational algebra will help the student model and design solutions in DBMS.

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Mapping	LOW/MEDIUM/HIGH	Justification
CST 204.3-PO2	**H**	Students will be able to analyse the real-world problems and will be able to write relational algebra and SQL for solving it.
CST 204.3-PO3	**H**	Students will be able to design and develop database applications by using SQL.
CST 204.3-PO4	**M**	Students will be able to conduct investigations on existing database and derive summary from it.
CST 204.3-PO12	**H**	The knowledge in relational algebra and SQL will help the students to design database applications in all future projects.
CST 204.3-PSO1	**L**	Students will be able to analyse and design database solutions by applying the foundational concepts of relational algebra and SQL.
CST 204.3-PSO2	**M**	Students will be able to apply software engineering principles in development of relational algebra and SQL queries.
CST 204.3-PSO3	**M**	Students can solve the database design problems by using relational algebra and SQL queries.
CST 204.4-PO1	**M**	The knowledge in Indexing and hashing will help the students to optimise the databases. Need more practice to create highly optimised databases.
CST 204.4-PO2	**H**	Students will be able to analyse the optimisation problems in database and improve the optimisation using Indexing and hashing.
CST 204.4-PO3	**H**	Students will be able to design and develop the optimised database applications.

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Mapping	LOW/MEDIUM/HIGH	Justification
CST 204.4-PO10	L	The effective optimisation writing skills will help the students to develop stable databases
CST 204.4-PO12	**H**	The knowledge in optimisation will help the students to design efficient database applications in all future projects
CST 204.4-PSO1	**H**	Students will be able to analyse and design optimised database solutions by applying the foundational concepts of indexing and hashing.
CST 204.4-PSO2	**H**	Students will be able to apply software engineering principles in development optimised database applications.
CST 204.4-PSO3	**H**	Students can solve the database optimisation problems by using indexing and hashing.
CST 204.5-PO1	**M**	The knowledge in Concurrency control will help the students to avoid conflict in simultaneous database operations.
CST 204.5-PO2	**H**	Students will be able to analyse concurrency issues in databases.
CST 204.5-PO3	**H**	Students will be able to design and develop databases that supports the concurrent transactions.
CST 204.5-PO10	**L**	Students will be able to write concurrent database applications but more experience required to write it properly.
CST 204.5-PO12	**H**	The knowledge in concurrency control will help the students to design database applications that can handle simultaneous operations in all their future projects
CST 204.5-PSO1	**H**	Students will be able to analyse and design database solutions with concurrency control by applying the foundational concepts they learned.
CST 204.5-PSO2	H	Students will be able to apply software engineering principles in development of

Mapping	LOW/MEDIUM/HIGH	Justification
		database applications that can handle simultaneous operations.
CST 204.5-PSO3	H	Students can solve the database concurrency problems.
CST 204.6-PO1	L	Students will have a basic knowledge in NoSQL Databases
CST 204.6-PO2	L	Students will have basic analysing skills in NOSQL Databases
CST 204.6-PO3	L	Students will be able to develop basic NoSQL queries.
CST 204.6-PO5	M	Students will have a moderate knowledge in using the NoSQL software tools.
CST 204.6-PO10	L	Students will have a basic skill in writing NoSQL queries
CST 204.6-PO12	H	The knowledge in NoSQL will help the students to design unstructured database applications all their future projects
CST 204.6-PSO1	L	Students will have a basic analysis and design skills in solving computational problems using NoSQL
CST 204.6-PSO2	H	Students will be able to apply software engineering concepts in developing NoSQL Queries
CST 204.6-PSO3	L	Students will able to solve basic problems using NoSQL

ST. JOSEPH'S COLLEGE OF SCIENCE AND TECHNOLOGY

COURSE OUTCOME : MAT206 GRAPH THEORY

The Students will be able to

CO	Course outcome	Knowledge level
CO1	Explain vertices and their properties , types of paths , classification of graphs and trees and their properties.	K2
CO2	Demonstrate the fundamental theorems on Eulerian and Hamiltonian Graphs.	K3
CO3	Illustrate the working of Prim's and Kruskal's algorithms for finding minimum cost spanning tree and Dijkstra's algorithm and Floyd-Warshall algorithms for finding shortest paths.	K3
CO4	Explain Planar graphs , their properties and an application for planar graph.	K3
CO5	Illustrate how one can represent a graph in a computer	K3
CO6	Explain the vertex color problem in graphs and illustrate an example application for vertex coloring.	K3

CO-PO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	-	-	-	-	1	-	3	3	1	2
CO2	3	3	3	3	-	-	-	-	-	1	-	3	3	1	2
CO3	3	3	3	3	-	-	-	-	-	1	-	3	3	1	2
CO4	3	3	3	2	-	-	-	-	-	1	-	3	3	1	2
CO5	3	3	3	-	-	-	-	-	-	1	-	3	3	1	2
CO6	3	3	3	-	-	2	-	-	-	1	-	3	3	1	2
AVG	3	3	2.83	2.33	-	2	-	1	-	1	-	3	3	1	2

COURSE NAME : MAT206 GRAPH THEORY

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	LOW/MEDIUM/HIGH	Justification
CO1-PO1	**H**	The knowledge of fundamental concepts in graph theory helps in analysis of performance of solutions to complex problems
CO1-PO2	**H**	The knowledge of fundamental concepts in graph theory will help the students to apply the same to identify and analyse engineering problems
CO1-PO3	**H**	The knowledge of fundamental concepts in graph theory help in the design and development of abstract models for computational problems
CO1-PO10	**L**	The knowledge of fundamental concepts in graph theory help to 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.
CO1-PO12	**H**	The knowledge of graph theory concepts helps the student in lifelong learning in the context of technology change
CO1-PSO1	**H**	The knowledge in different graph theory concepts will help in the design and development of abstract models for computational problems
CO1-PSO2	**L**	The graph theory concepts can be used to developing quality software for scientific and business applications using software engineering principles.
CO1-PSO3	**M**	The graph theory concepts enable user to adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems that is identified.
CO2-PO1	**H**	Use graph theoretic concepts like Eulerian graph and Hamiltonicity theory helps in analysis of performance of solutions to complex problems
CO2-PO2	**H**	Use graph theoretic concepts like Eulerian graph and Hamiltonicity theory will help the students to apply the same to identify and analyse engineering problems
CO2-PO3	**H**	The knowledge of fundamental concepts in graph theory like Eulerian graph and Hamiltonicity theory help in the design and

		development of abstract models for computational problems
CO2-PO4	**M**	The knowledge like Eulerian graph and Hamiltonicity theory help in designing solutions to complex problems
CO2-PO10	**L**	The knowledge like Eulerian graph and Hamiltonicity theory help to 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.
CO2-PO12	**H**	The knowledge of graph theory concepts like Eulerian graph and Hamiltonicity theory helps the student in lifelong learning in the context of technology change
CO2-PSO1	**H**	The knowledge in different graph theory concepts like Eulerian graph and Hamiltonicity theory will help in the design and development of abstract models for computational problems
CO2-PSO2	**L**	The graph theory concepts like Eulerian graph and Hamiltonicity theory can be used to developing quality software for scientific and business applications using software engineering principles.
CO2-PSO3	**M**	The graph theory concepts like Eulerian graph and Hamiltonicity theory enable user to adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems that is identified.
CO3-PO1	**H**	This knowledge of graph theoretic algorithms helps in analysis of performance of solutions to complex problems
CO3-PO2	**H**	This knowledge of graph theoretic algorithms will help the students to apply the same to identify and analyse engineering problems
CO3-PO3	H	This knowledge of graph theoretic algorithms help in the design and development of abstract models for computational problems
C3-PO4	**H**	This knowledge of graph theoretic algorithms help in designing solutions to complex problems
CO3-PO10	**L**	This knowledge of graph theoretic algorithms help to 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.

CO3-PO12	**H**	This knowledge of graph theoretic algorithms helps the student in lifelong learning in the context of technology change.
CO3-PSO1	**H**	This knowledge of graph theoretic algorithms help in the design and development of abstract models for computational problems
CO3-PSO2	**L**	This knowledge of graph theoretic algorithms help in developing quality software for scientific and business applications using software engineering principles.
CO3-PSO3	**M**	This knowledge of graph theoretic algorithms enable user to adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems that is identified.
CO4-PO1	**H**	This knowledge of graph connectivity, planar and non-planar graphs helps in analysis of performance of solutions to complex problems
CO4-PO2	**H**	This knowledge of graph connectivity, planar and non-planar graphs will help the students to apply the same to identify and analyse engineering problems
CO4-PO3	**H**	This knowledge of graph connectivity, planar and non-planar graphs help in the design and development of abstract models for computational problems
CO4-PO4	**M**	This knowledge of graph connectivity, planar and non-planar graphs help in designing solutions to complex problems
CO4-PO10	**L**	This knowledge of graph connectivity, planar and non-planar graphs help to 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.
CO4-PO12	**H**	The knowledge of graph theory concepts helps the student in lifelong learning in the context of technology change
CO4-PSO1	**H**	This knowledge of graph connectivity, planar and non-planar graphs help in the design and development of abstract models for computational problems
CO4-PSO2	**L**	This knowledge of graph connectivity, planar and non-planar graphs help in developing quality software for scientific and business applications using software engineering principles.

CO4-PSO3	**M**	This knowledge of graph connectivity, planar and non-planar graphs enable user to adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems that is identified.
CO5-PO1	**H**	This knowledge of graph matrices helps in analysis of performance of solutions to complex problems
CO5-PO2	**H**	This knowledge of graph matrices will help the students to apply the same to identify and analyse engineering problems
CO5-PO3	**M**	This knowledge of graph matrices help in the design and development of abstract models for computational problems
CO5-PO10	**L**	This knowledge of graph matrices help to 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.
CO5-PO12	**H**	This knowledge of graph matrices helps the student in lifelong learning in the context of technology change
CO5-PSO1	**H**	This knowledge of graph matrices help in the design and development of abstract models for computational problems
CO5-PSO2	**L**	This knowledge of graph matrices help in developing quality software for scientific and business applications using software engineering principles.
CO5-PSO3	**M**	This knowledge of graph matrices enable user to adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems that is identified.
CO6-PO1	**H**	This knowledge of Vertex color problems helps in analysis of performance of solutions to complex problems
CO6-PO2	**H**	This knowledge of Vertex color problems will help the students to apply the same to identify and analyse engineering problems
CO6-PO3	**M**	This knowledge of Vertex color problems help in the design and development of abstract models for computational problems
CO6-PO6	**M**	This knowledge of Vertex color problems help in applying 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.
CO6-PO10	**L**	This knowledge of Vertex color problems help to 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.
CO6-PO12	**H**	This knowledge of Vertex color problems helps the student in lifelong learning in the context of technology change
CO6-PSO1	**H**	This knowledge of Vertex color problems help in the design and development of abstract models for computational problems
CO6-PSO2	**L**	This knowledge of Vertex color problems help in developing quality software for scientific and business applications using software engineering principles.
CO6-PSO3	**M**	This knowledge of Vertex color problems enable user to adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems that is identified.

Department of Computer Science and Engineering

Programme : Bachelor of Technology | Course Code: CST 206

Course Name: Operating Systems | Semester: 4

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CST206.1	Explain the relevance, structure and functions of Operating Systems in computing devices.	K2
CST206.2	Illustrate the concepts of process management and process scheduling mechanisms employed in Operating Systems.	K2
CST206.3	Explain process synchronization in Operating Systems and illustrate process synchronization mechanisms using Mutex Locks, Semaphores and Monitors	K2
CST206.4	Explain any one method for detection, prevention, avoidance and recovery for managing deadlocks in Operating Systems.	K2
CST206.5	Explain the memory management algorithms in Operating Systems.	K2
CST206.6	Explain the security aspects and algorithms for file and storage management in Operating Systems.	K2

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	2	2	2	-	-	-	-	-	-	1	-	2	1	-	-
CO2	2	2	2	2	-	-	-	-	-	1	-	2	2	-	-
CO3	2	2	2	2	-	-	-	-	-	1	-	2	2	-	-
CO4	2	2	2	2	-	-	-	-	-	1	-	2	2	-	-
CO5	2	2	2	1	-	-	-	-	-	1	-	2	2	-	-
CO6	2	1	1	1	-	-	-	-	-	1	-	2	1	-	-
AVG					-	-	-	-	-		-				-

Correlation : 1-Low, 2-Moderate, 3-High, No Correlation '-'

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
CST206.1-PO1	M	Understanding the relevance, structure and functions of Operating Systems in computing devices, students are able to gain the knowledge various types operating systems used in different computing environments, different functions performed by operating systems includes process, memory, storage management and security it provides.
CST206.1-PO2	M	With the knowledge gained to explain the relevance, structure and functions of Operating Systems in computing devices, students are able to identify the functionalities and computing resources
CST206.1-PO3	L	Understanding the relevance, structure and functions of Operating Systems in computing devices, students are able to perform systematic evaluation of the degree to which several design concepts meet the criteria
CST206.1-PO10	L	With the knowledge gained to explain the relevance, structure and functions of Operating Systems in computing devices, the students are able to read, understand and interpret technical and non-technical information
CST206.1-PO12	M	With the knowledge gained to explain the relevance, structure and functions of Operating Systems in computing devices, the students are able to recognize the need and be able to clearly explain why it is vitally important to keep current regarding new developments in the field; recently regarding the launch of Windows 11.
CST206.2-PO1	M	With the understanding of SIC, SIC/XE machine architectures, their addressing modes and instruction

		set, students are able to apply the knowledge for the solution of engineering problems.
CST206.2-PO2	M	With the understanding of SIC, SIC/XE machine architectures, their addressing modes and instruction set, students are able to identify algorithms and parameter to solve a problem.
CST206.2-PO3	M	With the understanding of SIC, SIC/XE machine architectures, their addressing modes and instruction set, the students are able to refine architecture design into a detailed design within the existing constraints.
CST206.2-PO12	L	With the understanding of SIC, SIC/XE machine architectures, their addressing modes and instruction set, the students are able to identify changing trends in engineering knowledge and practice
CST206.2-PS01	L	Students will be able to analyse, design and develop computing solutions with the knowledge of SIC, SIC/XE machine architectures, their addressing modes and instruction set.
CST206.3-PO1	M	With the understanding of various machine dependent features of assembler, linker and loader including the program relocation, the students are able to apply the gained knowledge to demonstrate competence in specialized engineering knowledge to the program
CST206.3-PO2	M	With the understanding of various machine dependent features of assembler, linker and loader including the program relocation, the students are able to apply the gained knowledge to identify design constraints for required performance criteria.
CST206.3-PO3	L	With the understanding of various machine dependent features of assembler, linker and loader including the program relocation, the students are able to implement and integrate the modules.

CST206.3-PO12	M	With the understanding of various machine dependent features of assembler, linker and loader including the program relocation, the students are able to comprehend technical literature and other credible sources of information.
CST206.3-PS01	L	Students will be able to analyse, design and develop computing solutions with the understanding of various machine dependent features of assembler, linker and loader including the program relocation
CST206.4-PO1	M	With the understanding of various machine independent features of microprocessor, assembler, linker and loader including the use of literals, control sections, macro expansion, the students are able to comprehend technical literature and other credible sources of information.
CST206.4-PO2	M	With the understanding of various machine independent features of microprocessor, assembler, linker and loader including the use of literals, control sections, macro expansion, the students are able to identify, assemble and evaluate information and resources.
CST206.4-PO12	M	With the understanding of various machine independent features of microprocessor, assembler, linker and loader including the use of literals, control sections, macro expansion, the students are able to comprehend technical literature and other credible sources of information.
CST206.4-PS01	L	Students will be able to analyse, design and develop computing solutions with the understanding of machine independent features of microprocessor, assembler, linker and loader including the use of literals, control sections, macro expansion.
CST206.5-PO1	H	With the design of algorithms for macroprocessors, assemblers, linkers and loaders and analysing the data structures involved, the students are able to

		demonstrate competence in engineering fundamentals.
CST206.5-PO2	H	With the design of algorithms for macroprocessors, assemblers, linkers and loaders and analysing the data structures involved, the students are able to demonstrate an ability to formulate a solution plan and methodology for an engineering problem
CST206.5-PO3	M	With the design of algorithms for macroprocessors, assemblers, linkers and loaders and analysing the data structures involved, the students are able to demonstrate an ability to advance an engineering design to defined end state.
CST206.5-PO4	M	With the design of algorithms for macroprocessors, assemblers, linkers and loaders and analysing the data structures involved, the students are able to demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding.
CST206.5-PO12	M	With the design of algorithms for macroprocessors, assemblers, linkers and loaders and analysing the data structures involved, the students are able to comprehend technical literature.
CST206.5-PS01	M	Students will be able to analyse, design and develop computing solutions with the design of algorithms for macroprocessors, assemblers, linkers and loaders and analysing the data structures involved.
CST206.6-PO1	M	With the understanding of features of device drivers, text editors, debuggers, their functionalities and capabilities, students are able to demonstrate competence in engineering fundamentals.
CST206.6-PO2	L	With the understanding of features of device drivers, text editors, debuggers, their functionalities and capabilities, the students are able to demonstrate an ability to execute a solution process and analyze results.

CST206.6-PO5	M	With the understanding of features of device drivers, text editors, debuggers, their functionalities and capabilities, the students are able to demonstrate an ability to select and apply discipline specific tools, techniques and resources
CST206.6-PO12	M	With the understanding of features of device drivers, text editors, debuggers, their functionalities and capabilities, the students are able to demonstrate an ability to identify changing trends in engineering knowledge and practice
CST206.6-PS01	L	Students will be able to analyse, design and develop computing solutions with the understanding the features of device drivers, text editors, debuggers, their functionalities and capabilities.
CST206.6-PSO2	L	Students will be able to develop quality software with the understanding the features of device drivers, text editors, debuggers, their functionalities and capabilities.

Department of Computer Science and Engineering

Programme : Bachelor of Technology | Course Code: CSL204

Course Name:Operating Systems Lab | Semester: 4

COURSE OUTCOMES

At the end of the course, the student should be able to:

CO	Course outcome	Knowledge level
CSL204.CO1	Illustrate the use of systems calls in Operating Systems. (Cognitive knowledge: Understand)	K2
CSL204.CO2	Implement Process Creation and Inter Process Communication in Operating Systems. (Cognitive knowledge: Apply)	K3
CSL204.CO3	Implement Fist Come First Served, Shortest Job First, Round Robin and Priority based CPU Scheduling Algorithms. (Cognitive knowledge: Apply)	K3
CSL204.CO4	Illustrate the performance of First in First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms. (Cognitive knowledge: Apply)	K3
CSL204.CO5	Implement modules for Deadlock Detection and Deadlock Avoidance in Operating Systems. (Cognitive knowledge: Apply)	K3
CSL204.CO6	Implement modules for Storage Management and Disk Scheduling in Operating Systems. (Cognitive knowledge: Apply)	K3

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CS352.CO1	2	2	2	-	-	-	-	1	-	1	-	3	2	-	2
CS352.CO2	3	3	3	-	-	-	-	1	-	1	-	3	3	-	2
CS352.CO3	3	3	3	2	-	-	-	1	-	1	-	3	3	-	2
CS352.CO4	3	3	3	2	-	-	-	1	-	1	-	3	3	-	2
CS352.CO5	3	3	3	2	-	-	-	1	-	1	-	3	3	-	2
CS352.CO6	3	3	3	2	-	-	-	1	-	1	-	3	3	-	2
AVG	2.83	2.83	2.83	2	-	-	-	1	-	1	-	3	2.83	-	2

Correlation : 1-Low, 2-moderate, 3-high, No Correlation '-'

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JUSTIFICATION

CO-PO	LEVEL (Low/Moderate/High)	JUSTIFICATION
CSL204.CO1-PO1	**MODERATE**	By illustrating the use of system calls, the students will be able to apply the knowledge in simple engineering problems.
CSL204.CO2-PO1	**HIGH**	By implementing Process Creation and Inter Process Communication in Operating Systems, the students will be able to apply the knowledge of IPC in complex engineering problems
CSL204.CO3-PO1	**HIGH**	By implement Fist Come First Served, Shortest Job First, Round Robin and Priority based CPU Scheduling Algorithms, the students will be able to apply the knowledge of scheduling in complex engineering problems
CSL204.CO4-PO1	**HIGH**	By illustrating the performance of First in First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms, the students will be able to apply the knowledge of page replacement algorithms in complex engineering problems
CSL204.CO5-PO1	**HIGH**	By implementing modules for Deadlock Detection and Deadlock Avoidance in Operating Systems, the students will be able to apply the knowledge of deadlock detection and avoidance in complex engineering problems
CSL204.CO6-PO1	**HIGH**	By implementing modules for Storage Management and Disk Scheduling in Operating Systems, the students will be able to apply the knowledge in complex engineering problems
CSL204.CO1-PO2	**MODERATE**	By illustrating the use of system calls, the students will be able to identify and formulate simple engineering problems.

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CSL204.CO2-PO2	**HIGH**	By implementing Process Creation and Inter Process Communication in Operating Systems, the students will be able to identify and formulate complex engineering problems.
CSL204.CO3-PO2	**HIGH**	By implement Fist Come First Served, Shortest Job First, Round Robin and Priority based CPU Scheduling Algorithms, the students will be able to identify and formulate complex engineering problems.
CSL204.CO4-PO2	**HIGH**	By illustrating the performance of First in First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms, the students will be able to identify and formulate complex engineering problems.
CSL204.CO5-PO2	**HIGH**	By implementing modules for Deadlock Detection and Deadlock Avoidance in Operating Systems, the students will be able to identify and formulate complex engineering problems.
CSL204.CO6-PO2	**HIGH**	By implementing modules for Storage Management and Disk Scheduling in Operating Systems, the students will be able to identify and formulate complex engineering problems.
CSL204.CO1-PO3	**MODERATE**	By illustrating the use of system calls, the students will be able to design solutions for simple engineering problems.
CSL204.CO2-PO3	**HIGH**	By implementing Process Creation and Inter Process Communication in Operating Systems, the students will be able to design solutions for complex engineering problems.
CSL204.CO3-PO3	**HIGH**	By implement Fist Come First Served, Shortest Job First, Round Robin and Priority based CPU Scheduling Algorithms, the students will be able to design solutions for complex engineering problems.
CSL204.CO4-PO3	**HIGH**	By illustrating the performance of First in First Out, Least Recently Used and Least Frequently Used

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		Page Replacement Algorithms, the students will be able to design solutions for complex engineering problems
CSL204.CO5-PO3	**HIGH**	By implementing modules for Deadlock Detection and Deadlock Avoidance in Operating Systems, the students will be able to design solutions for complex engineering problems.
CSL204.CO6-PO3	**HIGH**	By implementing modules for Storage Management and Disk Scheduling in Operating Systems, the students will be able to use research-based knowledge and research methods.
CSL204.CO3-PO4	**MODERATE**	By implement Fist Come First Served, Shortest Job First, Round Robin and Priority based CPU Scheduling Algorithms, the students will be able to use research-based knowledge and research methods.
CSL204.CO4-PO4	**MODERATE**	By illustrating the performance of First in First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms, the students will be able to use research-based knowledge and research methods
CSL204.CO5-PO4	**MODERATE**	By implementing modules for Deadlock Detection and Deadlock Avoidance in Operating Systems, the students will be able to use research-based knowledge and research methods.
CSL204.CO6-PO4	**MODERATE**	By implementing modules for Storage Management and Disk Scheduling in Operating Systems, the students will be able to use research-based knowledge and research methods.
CSL204.CO1-PO8	**LOW**	By illustrating the use of system calls, the students will be able to apply ethical principles and commit to professional engineering solutions.
CSL204.CO2-PO8	**LOW**	By implementing Process Creation and Inter Process Communication in Operating Systems, the

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		students will be able to apply ethical principles and commit to professional engineering solutions.
CSL204.CO3-PO8	**LOW**	By implement Fist Come First Served, Shortest Job First, Round Robin and Priority based CPU Scheduling Algorithms, the students will be able to apply ethical principles and commit to professional engineering solutions.
CSL204.CO4-PO8	**LOW**	By illustrating the performance of First in First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms, the students will be able to apply ethical principles and commit to professional engineering solutions.
CSL204.CO5-PO8	**LOW**	By implementing modules for Deadlock Detection and Deadlock Avoidance in Operating Systems, the students will be able to apply ethical principles and commit to professional engineering solutions.
CSL204.CO6-PO8	**LOW**	By implementing modules for Storage Management and Disk Scheduling in Operating Systems, the students will be able to apply ethical principles and commit to professional engineering solutions.
CSL204.CO1-PO10	**LOW**	By illustrating the use of system calls, the students will be able to communicate effectively on complex engineering activities.
CSL204.CO2-PO10	**LOW**	By implementing Process Creation and Inter Process Communication in Operating Systems, the students will be able to communicate effectively on complex engineering activities
CSL204.CO3-PO10	**LOW**	By implement Fist Come First Served, Shortest Job First, Round Robin and Priority based CPU Scheduling Algorithms, the students will be able to communicate effectively on complex engineering activities
CSL204.CO4-PO10	**LOW**	By illustrating the performance of First in First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms, the students will be

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		able to communicate effectively on complex engineering activities
CSL204.CO5-PO10	**LOW**	By implementing modules for Deadlock Detection and Deadlock Avoidance in Operating Systems, the students will be able to communicate effectively on complex engineering activities
CSL204.CO6-PO10	**LOW**	By implementing modules for Storage Management and Disk Scheduling in Operating Systems, the students will be able to communicate effectively on complex engineering activities
CSL204.CO1-PO12	**HIGH**	By illustrating the use of system calls, the students will be able to engage in continuous learning.
CSL204.CO2-PO12	**HIGH**	By implementing Process Creation and Inter Process Communication in Operating Systems, the students will be able to engage in continuous learning.
CSL204.CO3-PO12	**HIGH**	By implement Fist Come First Served, Shortest Job First, Round Robin and Priority based CPU Scheduling Algorithms, the students will be able to engage in continuous learning.
CSL204.CO4-PO12	**HIGH**	By illustrating the performance of First in First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms, the students will be able to engage in continuous learning.
CSL204.CO5-PO12	**HIGH**	By implementing modules for Deadlock Detection and Deadlock Avoidance in Operating Systems, the students will be able to engage in continuous learning.
CSL204.CO6-PO12	**HIGH**	By implementing modules for Storage Management and Disk Scheduling in Operating Systems, the students will be able to engage in continuous learning.

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CSL204.CO1-PSO1	**MODERATE**	By illustrating the use of system calls, the students will be able to analyze, design and develop computing solutions.
CSL204.CO2-PSO1	**HIGH**	By implementing Process Creation and Inter Process Communication in Operating Systems, the students will be able to analyze, design and develop computing solutions
CSL204.CO3-PSO1	**HIGH**	By implement Fist Come First Served, Shortest Job First, Round Robin and Priority based CPU Scheduling Algorithms, the students will be able to analyze, design and develop computing solutions.
CSL204.CO4-PSO1	**HIGH**	By illustrating the performance of First in First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms, the students will be able to analyze, design and develop computing solutions.
CSL204.CO5-PSO1	**HIGH**	By implementing modules for Deadlock Detection and Deadlock Avoidance in Operating Systems, the students will be able to analyze, design and develop computing solutions
CSL204.CO6-PSO1	**HIGH**	By implementing modules for Storage Management and Disk Scheduling in Operating Systems, the students will be able to analyze, design and develop computing solutions
CSL204.CO1-PSO3	**MODERATE**	By illustrating the use of system calls, the students will be able to adapt to emerging information and communication solutions.
CSL204.CO2-PSO3	**MODERATE**	By implementing Process Creation and Inter Process Communication in Operating Systems, the students will be able to emerging information and communication solutions
CSL204.CO3-PSO3	**MODERATE**	By implement Fist Come First Served, Shortest Job First, Round Robin and Priority based CPU Scheduling Algorithms, the students will be able to

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		emerging information and communication solutions.
CSL204.CO4-PSO3	**MODERATE**	By illustrating the performance of First in First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms, the students will be able to emerging information and communication solutions.
CSL204.CO5-PSO3	**MODERATE**	By implementing modules for Deadlock Detection and Deadlock Avoidance in Operating Systems, the students will be able to emerging information and communication solutions
CSL204.CO6-PSO3	**MODERATE**	By implementing modules for Storage Management and Disk Scheduling in Operating Systems, the students will be able to emerging information and communication solutions

SEMESTER 5

Department of Computer Science and Engineering

Programme : Bachelor of Technology | Course Code: CST303

Course Name: COMPUTER NETWORKS | Semester: 5

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CST303.CO1	Explain the features of computer networks, protocols, and network design models (Cognitive Knowledge: Understand)	K2
CST303.CO2	Describe the fundamental characteristics of the physical layer and identify the usage in network communication (Cognitive Knowledge: Apply)	K3
CST303.CO3	Explain the design issues of data link layer, link layer protocols, bridges and switches (Cognitive Knowledge: Understand)	K2
CST303.CO4	Illustrate wired LAN protocols (IEEE 802.3) and wireless LAN protocols (IEEE 802.11) (Cognitive Knowledge: Understand)	K2
CST303.CO5	Select appropriate routing algorithms, congestion control techniques, and Quality of Service requirements for a network (Cognitive Knowledge: Apply)	K3
CST303.CO6	Illustrate the functions and protocols of the network layer, transport layer, and application layer in inter-networking (Cognitive Knowledge: Understand)	K2

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CST303.CO1	3	2	-	-	-	-	-	-	-	-	-	3	3	1	2
CST303.CO2	3	3	2	-	-	-	-	-	-	-	-	3	3	1	-
CST303.CO3	3	2	1	-	-	-	-	-	-	-	-	3	3	1	-
CST303.CO4	3	2	1	-	-	-	-	-	-	-	-	2	3	1	-
CST303.CO5	3	2	1	1	-	-	-	-	-	-	-	3	3	1	2
CST303.CO6	3	2	1	-	-	2						3	3	1	2
AVG	3	2.16	1.2	1	-	2	-	-	-	-	-	2.8	3	1	2

Correlation : 1-Low, 2-moderate, 3-high, No Correlation '-'

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JUSTIFICATION

CO-PO	LEVEL (Low/ Moderate/ High)	JUSTIFICATION
CST303.1-PO1	H	Students could just apply the knowledge acquired to classify the features of computer networks.
CST303.1-PO2	M	Understanding the layer functions helps the students to identify and formulate the problems based on the layer
CST303.1-PO12	H	Knowledge in different layer functions helps to understand new technologies
CST303.1-PSO1	H	Apply fundamental concepts to classify the layers based on its function
CST303.1-PSO2	L	Understanding the layer functions and understanding the network factors, helps in analyzing and interpreting the quality of networks
CST303.1-PSO3	M	Understanding the layer functions helps the students to identify and apply innovative ideas for the problems based on layers.
CST303.2-PO1	H	Knowledge about the fundamental characteristics of physical layer
CST303.2-PO2	H	Identify formulate the usage of physical layer in network communication
CST303.2-PO3	M	Students can design solutions for physical layer issues and develop solutions for the same in network communication.
CST303.2-PO12	H	Students able to apply the solutions for the various physical layer issues and can apply new technologies in network communications.
CST303.2-PSO1	H	Apply fundamental concepts of physical layer and develop computing solutions.
CST303.2-PSO2	L	Apply fundamental concepts of physical layer in developing quality network
CST303.3-PO1	H	Apply the knowledge required to understand various data link layer design issues and data link protocols

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CST303.3-PO2	M	Apply the knowledge in identifying the appropriate channel access techniques for both wired and wireless communications
CST303.3-PO3	L	Students could apply knowledge to find solutions to complex data link layer problems
CST303.3-PO12	H	Knowledge in communication model helps to understand new technologies
CST303.3-PSO1	H	Apply fundamental concepts of data Link layer design issues and data link protocols
CST303.3-PSO2	L	Apply fundamental concepts of data link protocols helps in developing quality software's
CST303.4-PO1	H	Apply the knowledge required to understand different LAN protocols
CST303.4-PO2	M	Students could apply the knowledge to compare different Lan protocols.
CST303.4-PO3	L	Students could apply knowledge to find solutions to complex problems
CST303.4-PO12	M	Knowledge in different Lan Protocols helps to understand new technologies
CST303.4-PSO1	H	Apply fundamental concepts of different Lan protocols
CST303.4-PSO2	L	Apply fundamental concepts of different Lan protocols helps in developing quality software
CST303.5-PO1	H	Apply the knowledge required to understand various routing techniques
CST303.5-PO2	M	Applies the knowledge in identifying the appropriate end to end protocol for reliable communication
CST303.5-PO3	L	Studies about the various routing techniques helps the students to fix up the shortest path routes for packets in the network.
CST303.5-PO4	L	Understanding the various end to end protocols helps in analyzing and interpreting the quality of networks.
CST303.5-PO12	H	Knowledge in various routing algorithms helps to understand new technologies
CST303.5-PSO1	H	Apply fundamental concepts of various routing algorithms for a network

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CST303.5-PSO2	L	Apply fundamental concepts of various routing algorithms helps in developing quality software
CST303.5-PSO3	M	Apply solutions to novel problems in various routing algorithms
CST303.6-PO1	H	Apply the knowledge acquired on various applications over internet
CST303.6-PO2	M	Students could identify the various applications over internet
CST303.6-PO3	L	Students could apply knowledge to find solutions to complex problems
CST303.6-PO6	M	Knowledge in various aspects and functions of network layer, transport layer and application layer in internetworking helps in real life scenarios
CST303.6-PO12	H	Knowledge in various aspects and functions of network layer, transport layer and application layer in internetworking helps to understand new technologies
CST303.6-PSO1	H	Apply fundamental concepts of network layer, transport layer and application layer in internetworking
CST303.6-PSO2	L	Apply fundamental concepts of network layer, transport layer and application layer in internetworking helps in developing quality software
CST303.6-PSO3	M	Apply solutions to novel problems in network layer, transport layer and application layer in internetworking

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Programme : Bachelor of Technology | Course Code: CST 305

Course Name: System Software. | Semester: 5

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CST305.1	Distinguish software into system and application software categories	K2
CST305.2	Identify standard and extended architectural features of machines.	K3
CST305.3	Identify machine dependent features of system software	K3
CST305.4	Identify machine independent features of system software	K3
CST305.5	Design algorithms for system software and analyze the effect of data structures.	K3
CST305.6	Understand the features of device drivers and editing and debugging tools	K2

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	-	1	-	-	-	-	-	-	1	-	-	-
CO2	2	2	1	-	-	-	-	-	-	-	-	1	1	-	-
CO3	2	2	1	-	-	-	-	-	-	-	-	2	1	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	2	1	-	-
CO5	3	3	2	2	-	-	-	-	-	-	-	2	2	-	-
CO6	2	1	-	-	2	-	-	-	-	-	-	2	1	1	-
AVG	2	1.83	0.66	0.33	0.5	-	-	-	-	-	-	1.66	1	0.16	-

Correlation : 1-Low, 2-Moderate, 3-High, No Correlation '-'

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JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
CST305.1-PO1	L	Understanding to distinguish software into system software and application software, students are able to gain the knowledge in engineering fundamentals.
CST305.1-PO2	L	With the knowledge gained to distinguish software into system software and application software, students are able to identify the functionalities and computing resources
CST305.1-PO5	L	With the knowledge gained to distinguish software into system software and application software, the students are able to understand appropriate resources and modern engineering tools for engineering activities.
CST305.1-PO12	L	With the knowledge gained to distinguish software into system software and application software, the students are able to recognize the changing trends in engineering knowledge and practice.
CST305.2-PO1	M	With the understanding of SIC, SIC/XE machine architectures, their addressing modes and instruction set, students are able to apply the knowledge for the solution of engineering problems.
CST305.2-PO2	M	With the understanding of SIC, SIC/XE machine architectures, their addressing modes and instruction set, students are able to identify algorithms and parameter to solve a problem.
CST305.2-PO3	L	With the understanding of SIC, SIC/XE machine architectures, their addressing modes and instruction set, the students are able to refine architecture design into a detailed design within the existing constraints.
CST305.2-PO12	L	With the understanding of SIC, SIC/XE machine architectures, their addressing modes and instruction set, the students are able to identify changing trends in engineering knowledge and practice

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CST305.2-PS01	L	Students will be able to analyse, design and develop computing solutions with the knowledge of SIC, SIC/XE machine architectures, their addressing modes and instruction set.
CST305.3-PO1	M	With the understanding of various machine dependent features of assembler, linker and loader including the program relocation, the students are able to apply the gained knowledge to demonstrate competence in specialized engineering knowledge to the program
CST305.3-PO2	M	With the understanding of various machine dependent features of assembler, linker and loader including the program relocation, the students are able to apply the gained knowledge to identify design constraints for required performance criteria.
CST305.3-PO3	L	With the understanding of various machine dependent features of assembler, linker and loader including the program relocation, the students are able to implement and integrate the modules.
CST305.3-PO12	M	With the understanding of various machine dependent features of assembler, linker and loader including the program relocation, the students are able to comprehend technical literature and other credible sources of information.
CST305.3-PS01	L	Students will be able to analyse, design and develop computing solutions with the understanding of various machine dependent features of assembler, linker and loader including the program relocation
CST305.4-PO1	M	With the understanding of various machine independent features of microprocessor, assembler, linker and loader including the use of literals, control sections, macro expansion, the students are able to comprehend technical literature and other credible sources of information.
CST305.4-PO2	M	With the understanding of various machine independent features of microprocessor, assembler, linker and loader including the use of literals, control sections, macro expansion, the students are able to

		identify, assemble and evaluate information and resources.
CST305.4-PO12	M	With the understanding of various machine independent features of microprocessor, assembler, linker and loader including the use of literals, control sections, macro expansion, the students are able to comprehend technical literature and other credible sources of information.
CST305.4-PS01	L	Students will be able to analyse, design and develop computing solutions with the understanding of machine independent features of microprocessor, assembler, linker and loader including the use of literals, control sections, macro expansion.
CST305.5-PO1	H	With the design of algorithms for macroprocessors, assemblers, linkers and loaders and analysing the data structures involved, the students are able to demonstrate competence in engineering fundamentals.
CST305.5-PO2	H	With the design of algorithms for macroprocessors, assemblers, linkers and loaders and analysing the data structures involved, the students are able to demonstrate an ability to formulate a solution plan and methodology for an engineering problem
CST305.5-PO3	M	With the design of algorithms for macroprocessors, assemblers, linkers and loaders and analysing the data structures involved, the students are able to demonstrate an ability to advance an engineering design to defined end state.
CST305.5-PO4	M	With the design of algorithms for macroprocessors, assemblers, linkers and loaders and analysing the data structures involved, the students are able to demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding.
CST305.5-PO12	M	With the design of algorithms for macroprocessors, assemblers, linkers and loaders and analysing the data structures involved, the students are able to comprehend technical literature.

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CST305.5-PS01	M	Students will be able to analyse, design and develop computing solutions with the design of algorithms for macroprocessors, assemblers, linkers and loaders and analysing the data structures involved.
CST305.6-PO1	M	With the understanding of features of device drivers, text editors, debuggers, their functionalities and capabilities, students are able to demonstrate competence in engineering fundamentals.
CST305.6-PO2	L	With the understanding of features of device drivers, text editors, debuggers, their functionalities and capabilities, the students are able to demonstrate an ability to execute a solution process and analyze results.
CST305.6-PO5	M	With the understanding of features of device drivers, text editors, debuggers, their functionalities and capabilities, the students are able to demonstrate an ability to select and apply discipline specific tools, techniques and resources
CST305.6-PO12	M	With the understanding of features of device drivers, text editors, debuggers, their functionalities and capabilities, the students are able to demonstrate an ability to identify changing trends in engineering knowledge and practice
CST305.6-PS01	L	Students will be able to analyse, design and develop computing solutions with the understanding the features of device drivers, text editors, debuggers, their functionalities and capabilities.
CST305.6-PSO2	L	Students will be able to develop quality software with the understanding the features of device drivers, text editors, debuggers, their functionalities and capabilities.

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Programme : Bachelor of Technology | Course Code: CST 307

Course Name: Microprocessors and Microcontrollers | Semester: 5

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CST307.CO1	Illustrate the architecture, modes of operation and addressing modes of microprocessors	K2
CST307.CO2	Develop 8086 assembly language programs.	K3
CST307.CO3	Demonstrate interrupts, its handling and programming in 8086.	K3
CST307.CO4	Illustrate how different peripherals (8255,8254,8257) and memory are interfaced with microprocessors.	K2
CST307.CO5	Outline features of microcontrollers and develop low level programs.	K2

CO - PO - PSO MAPPING

CO	Programme Outcomes (PO)												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CST307.CO1	2	1	1	-	-	-	-	-	-	-	-	1	3	-	-
CST307.CO2	2	3	3	2	-	-	-	-	-	-	-	2	2	-	-
CST307.CO3	3	2	2	2	-	-	-	-	-	-	-	2	3	-	1
CST307.CO4	3	2	2	2	-	-	-	-	-	-	-	2	2	-	-
CST307.CO5	3	2	2	2	-	-	-	-	-	-	-	2	2	-	-
Average	3	2	2	2	-	-	-	-	-	-	-	2	2	-	1

Correlation: 1-Low, 2-moderate, 3-high, No Correlation '-'

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JUSTIFICATION

Mapping	Low/Medium/ High	Justification
CST307.CO1-PO1	M	They could apply the knowledge acquired to describe the concepts of microprocessor-based systems.
CST307.CO1-PO2	L	The students will be able to identify and formulate solutions using the concepts of microprocessors
CST307.CO1-PO3	L	Design and develop solutions with the different modes of operations
CST307.CO1-PO12	L	Lifelong learning in the broadest context of technological change on the different modes of microprocessors
CST307.CO1-PSO1	H	Using different operational modes students will be able to Analyze, design and develop computing solutions
CST307.CO2-PO1	M	Design and develop 8086 assembly language programs using various assembler directives engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
CST307.CO2-PO2	H	Assembly language programs can be used to identify and formulate complex problems
CST307.CO2-PO3	H	Designing solutions for complex problems can be done with assembly language programs
CST307.CO2-PO4	M	Development of assembly language programs can be used to design experiments and for analysis
CST307.CO2-PO12	M	Programs can be implemented in the broadest context as technology changes.
CST307.CO2-PSO1	M	The students will be able to analyze, design and develop computing solutions.
CST307.CO3-PO1	H	The students will be able to use the basics of interrupts to find solutions for complex engineering problems.

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CST307.CO3-PO2	M	Analyze engineering problems with concepts of interrupts.
CST307.CO3-PO3	M	Design solutions with interrupt service routine.
CST307.CO3-PO4	M	Designing various experiments with interrupts
CST307.CO3-PO12	M	With the knowledge of handling interrupts, the need for independent and life-long learning in the technological change can be considered.
CST307.CO3-PSO1	H	Students will be able to analyze, design and develop computing solutions with the knowledge of interrupts.
CST307.CO3-PSO3	L	Students will be able to adapt to emerging information and communication technologies by providing innovative solutions to novel problems with the knowledge gained from interrupt service routine.
CST307.CO4-PO1	H	By applying engineering knowledge and fundamentals interfacing with different peripheral devices can be done.
CST307.CO4-PO2	M	Analyze engineering problems through interfacing.
CST307.CO4-PO3	M	Design solutions through interfacing with external devices and memory.
CST307.CO4-PO4	M	Designing various experiments through interfacing with various devices.
CST307.CO4-PO12	M	With the knowledge of interfacing external devices, the need for independent and life-long learning in the technological change can be considered.
CST307.CO4-PSO1	M	Students will be able to analyze, design and develop computing solutions with the knowledge of interfacing external devices and memory.
CST307.CO5-PO1	H	By analyzing features and with the knowledge about assembly language programs using 8051 microcontroller , students are able to apply the knowledge for the solution of engineering problems.
CST307.CO5-PO2	M	With the knowledge of 8051 microcontroller features ,students are able to analyze the engineering problems.
CST307.CO5-PO3	M	With the knowledge about design and development assembly language programs using 8051 microcontroller, students are able to design system components.
CST307.CO5-PO4	M	With the knowledge about design and development of assembly language programs using 8051 microcontroller, students are able to

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		conduct design of experiments, analysis and interpretation of data to provide valid conclusions.
CST307.CO5-PO12	M	With the knowledge on design and development of assembly language programs using 8051 microcontroller, the students are able to recognize the need to engage in life-long learning in the broadest context of technological change
CST307.CO5-PSO1	M	Students will be able to analyze, design and develop computing solutions with the knowledge of design and development of assembly language programs using 8051 microcontroller

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Programme : Bachelor of Technology | Course Code: CSL 333

Course Name: DBMS LAB | Semester: 5

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CSL333.CO1	Design database schema for a given real world problem-domain using standard design and modeling approaches. (Cognitive Knowledge Level: Apply).	K3
CSL333.CO2	Construct queries using SQL for database creation, interaction, modification, and updation. (Cognitive Knowledge Level: Apply)	K3
CSL333.CO3	Design and implement triggers and cursors. (Cognitive Knowledge Level: Apply)	K3
CSL333.CO4	Implement procedures, functions, and control structures using PL/SQL. (Cognitive Knowledge Level: Apply)	K3
CSL333.CO5	Perform CRUD operations in NoSQL Databases. (Cognitive Knowledge Level: Apply)	K3
CSL333.CO6	Develop database applications using front-end tools and back-end DBMS. (Cognitive Knowledge Level: Create)	K6

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSL333.CO1	3	3	3		3			2		2		2	3	-	3
CSL333.CO2	3	2	3		3			2		2		2	2	-	2
CSL333.CO3	3	2	2	2	2			2		2		2	3	-	-
CSL333.CO4	3	2	2	2	2			2		2		2	3	-	-
CSL333.CO5	3	2	2		2			2		2		2	3	-	-
CSL333.CO6	3	2	2	2	2	2		2	2	2	2	2	2	-	2
AVG	3	2.16	2.33	2	2.16	2		2	2	2	2	2	2.66	1	2.33

Correlation : 1-Low, 2-moderate, 3-high, No Correlation '-'

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JUSTIFICATION

CO-PO	LEVEL (Low/Moderate/High)	JUSTIFICATION
CSL333.CO1-PO1	**H**	The students will be able design database schema for a given real world problem-domain using standard design and modeling approaches by which the students will be able to apply engineering knowledge in complex engineering problems.
CSL333.CO1- PO2	**H**	The students can able to design database schema for analyzing a given real world problem-domain using standard design and modeling approaches.
CSL333.CO1-PO3	**H**	Students can able to develop the solutions of complex engineering problems using standard design and modeling approaches in database.
CSL333.CO1-PO5	**H**	The students will be able design database schema for a given real world problem-domain using standard design and modeling approaches and modern tool usage.
CSL333.CO1-PO8	**M**	Students can apply ethical principles and commit to professional ethics and responsibilities while designing database schema for a given real world problem
CSL333.CO1-PO10	**M**	Students can effectively communicate on complex engineering activities while designing database schema for a given real world problem
CSL333.CO1-PO12	**M**	Students can apply in the area of designing database schema for a given real world problem-domain using standard design and modeling approaches to engage in independent

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		and life -long learning in the broadest context of technological change.
CSL333.CO1-PSO1	**H**	The students can analyse, design and develop the solutions applying the concepts of datamining and warehousing.
CSL333.CO1-PSO3	**H**	Students can able to apply adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems in the area of datamining and warehousing.
CSL333.CO2-PO1	**H**	Students can construct queries using SQL for database creation, interaction, modification, and updation by applying engineering knowledge
CSL333.CO2-PO2	**M**	Students can construct queries using SQL for database creation, interaction, modification, and updation for problem analysis.
CSL333.CO2-PO3	**H**	Students can construct queries using SQL for database creation, interaction, modification, and updation for designing solutions.
CSL333.CO2-PO5	**H**	Students can construct queries using SQL for database creation, interaction, modification, and updation using modern tool.
CSL333.CO2-PO8	**M**	Students can apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice while constructing queries using SQL for database creation, interaction, modification, and updation
CSL333.CO2-PO10	**M**	Students can communicate effectively on complex engineering activities while constructing queries using SQL for database

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		creation, interaction, modification, and updation
CSL333.CO2-PO12	**M**	Students can construct queries using SQL for database creation, interaction, modification, and updation to engage in independent and life -long learning in the broadest context of technological change.
CSL333.CO2-PSO1	**M**	Students can be able to analyze, design and develop solutions by applying queries using SQL.
CSL333.CO2-PSO3	**M**	Students can provide innovative ideas and solutions to novel problems using SQL queries.
CSL333.CO3-PO1	**H**	Students can able to apply engineering knowledge in design and implement triggers and cursors.
CSL333.CO3-PO2	**M**	Students can able to design and implement triggers and cursors in appropriate complex engineering problems.
CSL333.CO3-PO3	**M**	Students can design solutions for complex engineering problems and applying triggers and cursors in appropriate domain.
CSL333.CO3-PO4	**M**	Students can use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid applying triggers and cursor in appropriate domain.
CSL333.CO3-PO5	**M**	Students can design and implement triggers and cursors in appropriate complex engineering problems using modern tools in appropriate domain.
CSL333.CO3-PO8	**M**	Students can apply ethical principles while implementing triggers and cursors

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CSL333.CO3-PO10	**M**	Students can able to communicate effectively about various classification algorithms while implementing triggers and cursors
CSL333.CO3-PO12	**M**	Students can design and implement triggers and cursors to engage in independent and life - long learning in the broadest context of technological change.
CSL333.CO3-PSO1	**M**	Students can analyze, design and develop the solutions by applying concepts triggers and cursors.
CSL333.CO4.PO1	**H**	Students can apply the knowledge of mathematics, science, engineering fundamentals to implement procedures, functions, and control structures using PL/SQL
CSL333.CO4.PO2	**M**	Students can implement procedures, functions, and control structures using PL/SQL for performance metrics and engineering sciences.
CSL333.CO4.PO3	**M**	Students can design solutions for complex engineering problems by implementing procedures, functions, and control structures using PL/SQL
CSL333.CO4.PO4	**M**	Students can analysis and interpret data, and synthesis of the information to provide valid conclusions while implementing procedures, functions, and control structures using PL/SQL
CSL333.CO4.PO5	**M**	Students can implement procedures, functions, and control structures using PL/SQL using modern tools in appropriate domain.
CSL333.CO4.PO8	**M**	Students can implement procedures, functions, and control structures using PL/SQL by considering the ethics.
CSL333.CO4.PO10	**M**	Students can able to communicate effectively in implementing procedures, functions, and control structures using PL/SQL

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CSL333.CO4.PO12	**M**	Students can implement procedures, functions, and control structures using PL/SQL via lifelong learning.
CSL333.CO4.PSO1	**H**	Students can implement procedures, functions, and control structures using PL/SQL by applying foundational concepts of Computer Science and Engineering.
CSL333.CO5-PO1	**H**	Students can apply the engineering knowledge to perform CRUD operations in NoSQL Databases.
CSL333.CO5-PO2	**M**	The students can analyze the complex engineering problems and can perform CRUD operations in NoSQL Databases.
CSL333.CO5-PO3	**M**	The students can design the solutions of complex problems by performing CRUD operations in NoSQL Databases.
CSL333.CO5-PO5	**M**	Students can perform CRUD operations in NoSQL Databases by using modern tool.
CSL333.CO5-PO8	**M**	Students can apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice to real world scenario while using CRUD operations in NoSQL Databases
CSL333.CO5-PO10	**M**	Students can communicate effectively on complex engineering activities with the engineering community and with society at large, while performing CRUD operations in NoSQL Databases.
CSL333.CO5-PO12	**M**	Students can able to perform lifelong learning while dealing with CRUD operations in NoSQL Databases.
CSL333.CO5-PSO1	**M**	Students can be able to analyze, design and develop computing solutions by applying foundational concepts of Computer Science

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		and Engineering to real world while dealing with CRUD operations in NoSQL Databases
CSL333.CO6-PO1	**H**	Student can develop database applications using front-end tools and back-end DBMS using engineering knowledge.
CSL333.CO6-PO2	**M**	The students can analyze the complex engineering and can develop database applications using front-end tools and back-end DBMS.
CSL333.CO6-PO3	**M**	The students can develop the solutions for complex engineering problems by developing database applications using front-end tools and back-end DBMS.
CSL333.CO6-PO4	**M**	The students can use the research-based knowledge for develop the solutions for complex engineering problems while developing database applications using front-end tools and back-end DBMS.
CSL333.CO6-PO5	**M**	Students can make use of modern tools while developing database applications using front-end tools and back-end DBMS.
CSL333.CO6-PO6	**M**	Students can make use of engineer and society while developing database applications using front-end tools and back-end DBMS.
CSL333.CO6-PO8	**M**	Students can apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice while developing database applications using front-end tools and back-end DBMS
CSL333.CO6-PO9	**M**	Students have to work individually and team work is very important while developing database applications using front-end tools and back-end DBMS

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CSL333.CO6-PO10	**M**	Students can communicate effectively on complex engineering activities with the engineering community and with society at large, while developing database applications using front-end tools and back-end DBMS.
CSL333.CO6-PO11	**M**	Students can manage the project and finance effectively while developing database applications using front-end tools and back-end DBMS
CSL333.CO6-PO12	**H**	Students can recognize and engage the solutions for complex engineering problems while developing database applications using front-end tools and back-end DBMS.
CSL333.CO6-PSO1	**M**	Students can able to apply the knowledge of mathematics, science, engineering fundamentals, while developing database applications using front-end tools and back-end DBMS.
CSL333.CO6-PSO3	**M**	Students can develop database applications using front-end tools and back-end DBMS for providing innovative ideas and solutions to novel problems concept.

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Programme : Bachelor of Technology Course Code: CST 301

Course Name: **FORMAL LANGUAGES AND AUTOMATA THEORY** Semester: 5

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CST 301.1	Classify a given formal language into Regular, Context-Free, Context-Sensitive, Recursive, or Recursively Enumerable. [Cognitive knowledgelevel: Understand]	K2
CST 301.2	Explain a formal representation of a given regular language as a finitestate automaton, regular grammar, regular expression, and Myhill - Nerode relation. [Cognitive knowledge level: Understand]	K2
CST 301.3	Design a Pushdown Automaton and a Context-Free Grammar for a givencontext-free language. [Cognitive knowledge level: Apply]	K3
CST 301.4	Design Turing machines as language acceptors or transducers. [Cognitiveknowledge level: Apply]	K3
CST 301.5	Explain the notion of decidability. [Cognitive knowledge level: Understand]	K2

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CST 301.1	3	3	2	-	-	-	-	-	-	-	-	3	3	-	-
CST 301.2	3	3	2	-	-	-	-	-	-	-	-	3	3	-	-
CST 301.3	3	3	2	-	-	-	-	-	-	-	-	3	3	-	-
CST 301.4	3	3	2	-	-	-	-	-	-	-	-	3	3	-	-
CST 301.5	3	3	2	-	-	-	-	-	-	-	-	3	3	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	2	-	-	-	-	-	-	-	-	3	3	-	-

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JUSTIFICATION

Mapping	Low/Medium/High	JUSTIFICATION
CST 301.CO1-PO1	HIGH	The knowledge of formal languages helps the students to apply the same in engineering problems
CST 301.CO1-PO2	HIGH	The knowledge of formal languages helps the students to identify and review complex engineering problems
CST 301.CO1-PO3	MEDIUM	The ability to classify formal languages helps the students to design complex engineering problems in different areas.
CST 301.CO1-PO12	HIGH	The knowledge of formal languages helps the students to engage in independent and lifelong learning.
CST 301.CO1-PSO1	HIGH	The knowledge of formal languages helps the students to analyze, design, and develop computing solutions by applying foundational concepts of Computer Science and Engineering
CST 301.CO2-PO1	HIGH	The ability to design FSA, regular grammar, regular expression, and Myhill - Nerode relation representations for regular languages helps the students to Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
CST 301.CO2-PO2	HIGH	The ability to design FSA, regular grammar, regular expression and Myhill-Nerode relation representations for regular languages helps the students to Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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CST 301.CO2-PO3	MEDIUM	The ability to design FSA, regular grammar, regular expression and Myhill-Nerode relation representations for regular languages helps the students to 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.
CST 301.CO2-PO12	HIGH	The ability to design FSA, regular grammar, regular expression and Myhill-Nerode relation representations for regular languages helps the students to engage in independent and lifelong learning.
CST 301.CO2-PSO1	HIGH	The ability to design FSA, regular grammar, regular expression and Myhill-Nerode relation representations for regular languages helps the students to Analyze, design and develop computing solutions by applying foundational concepts of Computer Science and Engineering
CST 301.CO3-PO1	HIGH	The ability to design push-down automata and context-free grammar representations for context-free languages helps the students to Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
CST 301.CO3-PO2	HIGH	The ability to design push-down automata and context-free grammar representations for context-free languages helps the students to Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
CST 301.CO3-PO3	MEDIUM	The ability to design push-down automata and context-free grammar representations for context-free languages helps the students to 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.

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CST 301.CO3-PO12	HIGH	The ability to design push-down automata and context-free grammar representations for context-free languages helps the students to 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.
CST 301.CO3-PSO1	HIGH	The ability to design push-down automata and context-free grammar representations for context-free languages helps the students to Analyze, design and develop computing solutions by applying foundational concepts of Computer Science and Engineering.
CST 301.CO4-PO1	HIGH	The capability to design Turing Machines for accepting recursively enumerable languages helps the students to Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
CST 301.CO4-PO2	HIGH	The capability to design Turing Machines for accepting recursively enumerable languages helps the students to Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
CST 301.CO4-PO3	MEDIUM	The capability to design Turing Machines for accepting recursively enumerable languages helps the students to 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.
CST 301.CO4-PO12	HIGH	The capability to design Turing Machines for accepting recursively enumerable languages helps the students to 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.

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CST 301.CO5-PSO1	HIGH	The capability to design Turing Machines for accepting recursively enumerable languages helps the students to Analyze, design and develop computing solutions by applying foundational concepts of Computer Science and Engineering.
CST 301.CO5-PO1	HIGH	The knowledge of decidability and undecidability of problems, halting problem helps the students to Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
CST 301.CO5-PO2	HIGH	The knowledge of decidability and undecidability of problems, halting problem helps the students to Identify, formulate, review research literature, and analyze 0complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
CST 301.CO5-PO3	MEDIUM	The knowledge of decidability and undecidability of problems, halting problem helps the students to 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.
CST 301.CO5-PO12	HIGH	The knowledge of decidability and undecidability of problems, halting problem helps the students to 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.
CST 301.CO5-PSO1	HIGH	The knowledge of decidability and undecidability of problems, halting problem helps the students to Analyze, design and develop computing solutions by applying foundational concepts of Computer Science and Engineering.

Department of Computer Science and Engineering

Programme: Bachelor of Technology Course Code: CSL 331

Course Name: System Software and Microprocessors Lab Semester: 5

COURSE OUTCOMES

At the end of the course, the student should be able to:

CO	Course outcome	Knowledge level
CSL331.CO1	Develop 8086 programs and execute it using a microprocessor kit.	K3
CSL331.CO2	Develop 8086 programs and, debug and execute it using MASM assemblers	K3
CSL331.CO3	Develop and execute programs to interface stepper motor, 8255, 8279 and digital to analog converters with 8086 trainer kit.	K3
CSL331.CO4	Implement and execute different scheduling and paging algorithms in OS	K3
CSL331.CO5	Design and implement assemblers, Loaders and macroprocessors.	K3

CO - PO - PSO MAPPING

CO	Programme Outcomes(PO)												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSL331.CO1	3	3	3	2	-	-	-	2	-	2	-	3	3	-	-
CSL331.CO2	3	3	2	2	-	-	-	2	-	3	-	3	3	-	-
CSL331.CO3	3	3	2	2	-	-	-	2	-	3	-	3	3	-	2
CSL331.CO4	3	3	2	2	-	-	-	2	-	2	-	3	2	-	-
CSL331.CO5	3	3	2	2	-	-	-	2	-	2	-	3	2	-	-
Average	3	3	2	2	-	-	-	2	-	2	-	3	3	-	2

Correlation : 1-Low, 2-moderate, 3-high, No Correlation '-'

Department of Computer Science and Engineering

JUSTIFICATION

CO-PO	LEVEL (Low/Moderate/High)	JUSTIFICATION
CSL331.CO1-PO1	HIGH	By developing assembly language program using trainer kit, the students will be able to solve complex engineering problems related to embedded programming.
CSL331.CO1-PO2	HIGH	By developing assembly language program using trainer kit, the students will be able to identify, formulate and analyze complex engineering problems using the principles of engineering science.
CSL331.CO1-PO3	HIGH	By developing assembly language program using trainer kit, the students will be able to solve complex engineering problems and design small system components for various filed of society.
CSL331.CO1-PO4	MEDIUM	By developing assembly language program using trainer kit, the students will be able to use some kind of research-based knowledge for the design of experiments.
CSL331.CO1-PO8	MEDIUM	By developing assembly language program using trainer kit, the students will be able to apply ethical principles and commit to professional ethics of engineering practices.
CSL331.CO1-PO10	MEDIUM	By developing assembly language program using trainer kit, the students will be able to apply engineering management principles to his own work.
CSL331.CO1-PO12	HIGH	By developing assembly language program using trainer kit, the students will be able to engage in lifelong learning.
CSL331.CO1-PSO1	HIGH	By developing assembly language program using MASM and assembler directives, the students will be able to analyse, design and develop engineering solutions

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CSL331.CO2-PO1	HIGH	By developing assembly language program using MASM and assembler directives, the students will be able to solve complex engineering problems related to embedded programming.
CSL331.CO2-PO2	HIGH	By developing assembly language program using MASM and assembler directives, the students will be able to identify, formulate and analyse complex engineering problems using the principles of engineering science.
CSL331.CO2-PO3	MEDIUM	By developing assembly language program using MASM and assembler directives, the students will be able to solve complex engineering problems and design small system components for various filed of society.
CSL331.CO2-PO4	MEDIUM	By developing assembly language program using MASM and assembler directives, the students will be able to use some kind of research-based knowledge for the design of experiments.
CSL331.CO2-PO8	MEDIUM	By developing assembly language program using MASM and assembler directives, the students will be able to apply ethical principles and commit to professional ethics of engineering practices.
CSL331.CO2-PO10	HIGH	By developing assembly language program using MASM and assembler directives, the students will be able to apply engineering management principles to his own work.
CSL331.CO2-PO12	HIGH	By developing assembly language program using MASM and assembler directives, the students will be able to engage in lifelong learning.
CSL331.CO2-PSO1	HIGH	By developing assembly language program using MASM and assembler directives, the students will be able to analyse, design and develop engineering solutions
CSL331.CO3-PO1	HIGH	By implement interfacing of various I/O devices to the microprocessor, the students will be able to solve complex engineering problems related to embedded programming.

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CSL331.CO3-PO2	HIGH	By implement interfacing of various I/O devices to the microprocessor, the students will be able to identify, formulate and analyse complex engineering problems using the principles of engineering science.
CSL331.CO3-PO3	MEDIUM	By implement interfacing of various I/O devices to the microprocessor, the students will be able to solve complex engineering problems and design small system components for various filed of society.
CSL331.CO3-PO4	MEDIUM	By implement interfacing of various I/O devices to the microprocessor, the students will be able to use some kind of research-based knowledge for the design of experiments.
CSL331.CO3-PO8	MEDIUM	By implement interfacing of various I/O devices to the microprocessor, the students will be able to apply ethical principles and commit to professional ethics of engineering practices.
CSL331.CO3-PO10	HIGH	By implement interfacing of various I/O devices to the microprocessor, the students will be able to apply engineering management principles to his own work.
CSL331.CO3-PO12	HIGH	By implement interfacing of various I/O devices to the microprocessor, the students will be able to engage in lifelong learning.
CSL331.CO3-PSO1	HIGH	By implement interfacing of various I/O devices to the microprocessor, the students will be able to analyse, design and develop engineering solutions
CSL331.CO3-PSO3	MEDIUM	By implement interfacing of various I/O devices to the microprocessor, the students will be able to adapt to emerging information and communication technologies by providing innovative ideas.
CSL331.CO4-PO1	HIGH	By implementing and executing the CPU scheduling & paging algorithms students are able to apply the knowledge for the solution of engineering problems.

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CSL331.CO4-PO2	HIGH	With the knowledge of pre-emptive and non-pre-emptive scheduling algorithms, students are able to analyze the engineering problems.
CSL331.CO4-PO3	MEDIUM	With the knowledge of CPU Scheduling and paging algorithms, the students are able to design system components.
CSL331.CO4-PO4	MEDIUM	With the knowledge of pre-emptive and non-pre-emptive scheduling algorithms, the students are able to conduct investigations of complex problems.
CSL331.CO4-PO8	MEDIUM	With the design of experiments the students are able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
CSL331.CO4-PO10	MEDIUM	With the knowledge of scheduling and paging algorithms, the students are able to communicate effectively on complex engineering activities with engineering community, able to comprehend effectively give and receive clear instructions
CSL331.CO4-PO12	HIGH	With the knowledge of CPU Scheduling and paging algorithms, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CSL331.CO4-PSO1	MEDIUM	Students will be able to analyze, design and develop computing solutions with the knowledge of CPU Scheduling and paging algorithms.
CSL331.CO5-PO1	HIGH	With the knowledge of system software like assembler, loader and macro processor students are able to apply the knowledge for the solution of engineering problems.
CSL331.CO5-PO2	HIGH	With the knowledge of system software like assembler, loader and macro processor students are able to analyze the engineering problems.
CSL331.CO5-PO3	MEDIUM	With the knowledge of system software like assembler, loader and macro processor students are able to design system components.
CSL331.CO5-PO4	MEDIUM	With the knowledge of system software like assembler, loader and macro processor, the students are able to conduct investigations of complex problems.

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CSL331.CO5-PO8	MEDIUM	With the design of experiments the students are able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
CSL331.CO5-PO10	MEDIUM	With the knowledge of system software like assembler, loader and macro processor, the students are able to communicate effectively on complex engineering activities with engineering community, able to comprehend effectively give and receive clear instructions
CSL331.CO5-PO12	HIGH	With the knowledge of system software like assembler, loader and macro processor, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change.
CSL331.CO5-PSO1	MEDIUM	Students will be able to analyze, design and develop computing solutions with the knowledge of system software like assembler, loader and macro processor.

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Programme : B.Tech | Course Code: CST309

Course Name: MANAGEMENT OF SOFTWARE SYSTEMS | Semester: S5

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CST309.1	Demonstrate Traditional and Agile Software Development approaches	K3
CST309.2	Prepare Software Requirement Specification and Software Design for a given problem.	K3
CST309.3	Justify the significance of design patterns and licensing terms in software development, prepare testing, maintenance and DevOps strategies for a project	K3
CST309.4	Make use of software project management concepts while planning, estimation, scheduling, tracking and change management of a project, with a traditional/agile framework.	K3
CST309.5	Utilize SQA practices, Process Improvement techniques and Technology advancements in cloud based software models and containers & microservices	K3

CO - PO - PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CST309.1	3	3	3	3	-	2	-	-	-	-	-	3	3	2	3
CST309.2	3	3	3	2	-	2	-	-	-	2	3	2	3	3	2
CST309.3	3	3	2	2	-	-	-	2	-	3	3	2	3	2	2
CST309.4	3	3	3	2	-	2	-	-	2	3	2	3	3	2	3
CST309.5	3	3	3	3	-	3	-	-	-	-	-	3	3	2	3
AVG	3	3	3	2	-	2	-	2	2	3	3	3	3	2	3

Correlation : 1-Low, 2-Moderate, 3-High, No Correlation '-'

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JUSTIFICATION

CO	LOW/MEDIUM/HIGH	JUSTIFICATION
CST309.CO1-PO1	H	They could apply the knowledge required to describe various software engineering models
CST309.CO1-PO2	H	They could apply the knowledge to analyze different software engineering models
CST309.CO1-PO3	H	They could apply knowledge to design appropriate software engineering models for various types of projects
CST309.CO1-PO4	H	They could apply knowledge to compare traditional and agile software development models
CST309.CO1-PO6	M	With the knowledge of different software models, the students are able to apply knowledge to assess societal issues and responsibilities relevant to professional engineering practice.
CST309.CO1-PO12	H	With the knowledge of different software models, the students are able to recognize the need for and to understand new technologies.
CST309.CO1-PSO1	H	Students will be able to design software models for various engineering problems.
CST309.CO1-PSO2	M	Students will be able to apply software engineering principles and practices for developing quality software by various software process models.
CST309.CO1-PSO3	H	Students will be able to provide innovative solutions to novel problems with the knowledge gained from various software process models.
CST309.CO2-PO1	H	They could apply the knowledge required to prepare SRS and software design for a given problem.
CST309.CO2-PO2	H	They could apply the knowledge to analyze different design models.

CST309.CO2-PO3	H	They could apply knowledge to design requirement analysis and to choose appropriate design models for various types of project.
CST309.CO2-PO4	M	They could apply knowledge to compare different design models within the context of software engineering
CST309.CO2-PO6	M	With the knowledge of different design models, the students are able to apply knowledge to assess societal issues and responsibilities relevant to professional engineering practice.
CST309.CO2-PO10	M	The students are able to communicate the requirements effectively by creating SRS .
CST309.CO2-PO11	H	The students are able to manage project work through effective SRS and design models.
CST309.CO2-PO12	M	With the knowledge about SRS helps to prepare a professional document, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CST309.CO2-PO12	H	Students will be able to design software models for various engineering problems.
CST309.CO2-PSO1	H	Students will be able to prepare SRS and software design models for given engineering problem
CST309.CO2-PSO2	H	Students will be able to apply software engineering principles and practices for developing quality software by various software design models.
CST309.CO2-PSO3	M	Students will be able to provide innovative solutions to novel problems with the knowledge gained from various software design models.
CST309.CO3-PO1	H	They could apply the knowledge required to formulate appropriate testing strategy
CST309.CO3-PO2	H	They could apply the knowledge to analyze different testing methods.

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CST309.CO3-PO3	M	They could apply knowledge to design patterns and to choose appropriate licensing terms for various types of project.
CST309.CO3-PO4	M	They could apply knowledge to compare different testing and maintenance methods within the context of software engineering
CST309.CO3-PO8	M	With the knowledge of different testing methods the students are able to apply knowledge to assess societal issues and responsibilities relevant to professional engineering pratice
CST309.CO3-PO10	H	The students are able to communicate with testing team requirements effectively by Dev Ops strategy.
CST309.CO3-PO11	H	The students are able to manage project work through effective testing methods.
CST309.CO3-PO12	M	With the knowledge about DevOps the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CST309.CO3-PSO1	H	Students will be able to formulate testing and evaluate the system
CST309.CO3-PSO2	M	Students will be able to apply software engineering principles and practices for developing quality software by various testing methods.
CST309.CO3-PSO3	M	Students will be able to provide innovative solutions to novel problems with the knowledge gained from various software testing methods.
CST309.CO4-PO1	H	They could apply the concepts of software project management techniques while estimating cost and schedule for a given project.
CST309.CO4-PO2	H	They could apply the knowledge to analyze various cost estimation methods.

CST309.CO4-PO3	H	They could apply knowledge to choose appropriate cost estimation methods and team for various types of project.
CST309.CO4-PO4	M	They could apply knowledge to compare software project management in traditional and agile models.
CST309.CO4-PO6	M	With the knowledge of different software project management concepts ,the students are able to apply knowledge to assess societal issues a responsibilities relevant to the professional engineering practice
CST309.CO4-PO9	M	With the knowledge about software management principles,the students are able to function effectively as an individual, or a team leader in diverse or multidisciplinary settings
CST309.CO4-PO10	H	The students are able to communicate with in a team and mange people in that team.
CST309.CO4-PO11	M	The students are able to manage project work through scheduling,tracking and estimating.
CST309.CO4-PO12	H	With the knowledge about various risk, software pricing , the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CST309.CO4-PSO1	H	Students will be able to apply planning and scheduling in various types of software projects.
CST309.CO4-PSO2	M	Students will be able to apply software engineering principles and practices for developing quality software by various testing methods.
CST309.CO4-PSO3	H	Students will be able to provide innovative solutions to novel problems with the knowledge gained from project management principles.
CST309.CO5-PO1	H	They could apply the knowledge to describe SQA practices.
CST309.CO5-PO2	H	They could apply the knowledge to analyze various software process improvement methods.

CST309.CO5-PO3	H	They could apply knowledge to choose appropriate SQA practices and process Improvement techniques and technology.
CST309.CO5-PO4	H	They could apply knowledge to compare cloud and microservices
CST309.CO5-PO6	H	With the knowledge of SPI,the students are able to apply knowledge to assess societal issues a responsibilities relevant to the professional engineering practice
CST309.CO5-PO12	H	With the knowledge about microservices architecture, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CST309.CO5-PSO1	H	Students will be able to apply SQA principles in various types of software projects
CST309.CO5-PSO2	M	Students will be able to apply software engineering principles and practices for developing quality software by various testing methods
CST309.CO5-PSO3	H	Students will be able to provide innovative solutions to novel problems with the knowledge gained from microservice architecture

Prepared by

AKSHARA SASIDHARAN

Reby John

Course handling Faculty & Course Coordinator

Verified by

PAC Member

Approved by

Signature of HOD

SEMESTER 6

Programme: Bachelor of Technology | Course Code: CST 306

Course Name: Algorithm Analysis & Design | Semester: 6

COURSE OUTCOMES

The students will be able to

CO	Course outcome	Knowledge level
CST306.1	Analyze any given algorithm and express its time and space complexities in asymptotic notations.	K3
CST306.2	Derive recurrence equations and solve it using Iteration, Recurrence Tree, Substitution and Master's Method to compute time complexity of algorithms.	K3
CST306.3	Illustrate Graph traversal algorithms & applications and Advanced Data structures like AVL trees and Disjoint set operations.	K3
CST306.4	Demonstrate Divide-and-conquer, Greedy Strategy, Dynamic programming, Branch-and Bound and Backtracking algorithm design techniques.	K3
CST306.5	Classify a problem as computationally tractable or intractable, and discuss strategies to address intractability.	K2
CST306.6	Identify the suitable design strategy to solve a given problem.	K4

CO - PO - PSO MAPPING

CO	Programme Outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	2	-	-	-	-	-	-	-	2	3	-	-
CO2	2	3	2	2	-	-	-	-	-	-	-	1	2	-	-
CO3	1	2	2	2	-	-	-	-	-	-	-	2	2	3	1
CO4	2	3	3	2	-	-	-	-	-	-	-	3	3	2	2
CO5	1	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO6	2	2	3	3	-	-	-	-	-	-	-	3	3	2	2
AVG	**1.67**	**2.50**	**2.40**	**2.20**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.00**	**2.60**	**2.33**	**1.67**

Correlation: 1-Low, 2-Moderate, 3-High, '-' -No Correlation

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
CST 306.1-PO1	M	Students will be able to apply the knowledge of Mathematics and engineering specialisation for analyzing different algorithms and express its time and space complexities.
CST 306.1-PO2	H	Students will be able to find solutions of various complex Engineering problems using time and space complexities.
CST 306.1-PO3	M	Students will be able to find solutions of various complex Engineering problems using time and space complexities and choose the best among them.
CST 306.1-PO4	M	Students will be able to conduct investigations of complex problems, algorithms using time and space complexities.
CST 306.1-PO12	M	Students will be able to apply, analyse and choose the best algorithms based on their knowledge on classes of time and space complexities.
CST 306.1-PSO1	M	With the knowledge of time and space complexities students will be able to analyse computing solutions.
CST 306.2-PO1	M	With the knowledge of basic engineering Mathe matics students will be able to derive and solve recurrence equations.
CST 306.2-PO2	H	Students will be able to analyse complex Engineering problems using the methods to solve recurrence equations.
CST 306.2-PO3	M	Students will be able to develop solution of recursive algorithms using different methods.
CST 306.2-PO4	M	Students will be able to analyse different recursive algorithms and synthesis the solutions to provide valid conclusions.
CST 306.2-PO12	L	Students will be able to recognize the need for various method to solve recurrence equations.

CST 306.2-PSO1	M	With the knowledge to derive recurrence equations and its solutions students will be able to analyse and design solutions of Engineering problems.
CST 306.3-PO1	L	With the knowledge of basic engineering mathematics students will be able to apply that in graph traversal algorithms.
CST 306.3-PO2	M	With the knowledge of graph traversal algorithms and advanced data structures students should be able to anaylse complex engineering problems.
CST 306.3-PO3	M	With the knowledge of graph traversal algorithms and advanced data structures students should be able to design or develop solutions to real time complex engineering problems.
CST 306.3-PO4	M	With the knowledge of graph traversal algorithms and advanced data structures students should be able to analyse the complex problems to provide valid conclusions.
CST 306.3-PO12	M	Students will be able to apply the graph traversal algorithms in real life problems.
CST 306.3-PSO1	M	Students will be able to analyse,design and develop computing solutions using graph traversal algorithms and advanced data structures.
CST 306.3-PSO2	H	With the knowledge of graph traversal and data structure algorithms students will be able to apply software engineering principles for developing quality softwares.
CST 306.3-PSO3	L	With the knowledge of graph traversal and data structure algorithms students can adapt to emerging informations and provide innovative ideas and technologies.
CST 306.4-PO1	M	With the engineering knowledge of students will be able to use different algorithm design techniques to develop solutions for complex engineering problems.
CST 306.4-PO2	H	With the knowledge of algorithm design techniques students should be able to anaylse complex engineering problems.

CST 306.4-PO3	H	With the knowledge of algorithm design techniques students should be able to develop solutions to complex engineering problems.
CST 306.4-PO4	M	With the knowledge of algorithm design techniques students should be able to conduct investigations to complex engineering problems.
CST 306.4-PO12	H	Students will be able to use the best algorithm design techniques in real life problems.
CST 306.4-PSO1	H	With the knowledge of algorithm design techniques students will be able to analyse design and develop computing solutions.
CST 306.4-PSO2	M	With the knowledge of algorithm design techniques students will be able to apply software engineering practices for developing quality software.
CST 306.4-PSO3	M	With the knowledge of algorithm design techniques students will be able to adapt to develop innovative ideas.
CST 306.5-PO1	L	With the engineering knowledge of students will be able to classify a problem as computationally tractable or intractable.
CST 306.5-PO2	M	Students will be able to analyse the problem as tractable or intractable**.**
CST 306.5-PO12	L	Students will be able to understand a problem is tractable and intractable..
CST 306.6-PO1	M	With the engineering knowledge students will be able to identify the suitable design strategies to solve a given problem**.**
CST 306.6-PO2	M	Students will be able to analyse the given problem.
CST 306.6-PO3	H	Students will be able to develop suitable design strategies to solve a given problem.
CST 306.6-PO4	H	Students will be able to analyse suitable design strategies for a given problem.
CST 306.6-P012	H	Students will be able to recognize the need for identifying the suitable design strategy to solve a given problem.

CST 306.6-PSO1	H	Students will be able to analyse and design suitable design strategy to solve a given problem.
CST 306.6-PSO2	M	By identifying suitable design strategies students will be able to apply software principles to develop quality software.
CST 306.6-PSO3	M	By identifying suitable design strategies to solve a problem students will be able to adapt to emerging informations and communication technologies.

Programme: Bachelor of Technology
Course Code: CST362
Course Name: Programming in python
Semester: 6

COURSE OUTCOMES

The students will be able to:

	Course outcome	Knowledge level
CST362.CO1	Write,test,debug python programs	K3
CST362.CO2	Illustrate uses of conditional statement in python programs.	K3
CST362.CO3	Develop programs by utilizing the modules lists,tuples,sets dictionaries in python	K3
CST362.CO4	Develop graphical user interface for solutions using python libraries	K3
CST362.CO5	Implement object oriented programs with exception handling	K3
CST362.CO6	Write programs in python to process data stored in files by utilizing the modules Numpy,Matplotlib and pandas	K3

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	-	2	-	-	-	-	-		3	3	-	3
CO2	3	3	3	-	-		-	-	-		-	3	3	-	3
CO3	3	3	3	2	2			-	-	-	-	3	3	-	3
CO4	3	3	3	2	2	-		-	-	-	-	3	3	-	3
CO5	3	3	3	3	3		-	-	-	-	-	3	3	-	3
CO6	3	3	3	3	3	3	-	-	-	-	-	3	3	-	3

Correlation : 1-Low, 2-Moderate, 3-High, No Correlation '-'

JUSTIFICATION

Mapping	Low/Medium/High	JUSTIFICATION
CST362.CO1-PO1	H	The knowledge in programming language helps to solve problems.
CST362.CO1-PO2	M	The analysis of python program helps to understand problems.
CST362.CO1-PO3	H	The knowledge in programming methodologies helps in designing solutions for complex engineering problems
CST362.CO1-PO5	M	Modern IDES used to implement programming
CST362.CO1-PO12	H	Knowldege in python helps in software indrustry
CST362.CO1-PSO1	H	Apply fundamental concepts to solve problems
CST362.CO1-PSO3	H	Knowldege in python helps in solving complex projects
CST362.CO2-PO1	H	The knowledge in control statements helps to solve problems.
CST362.CO2-PO2	H	The analysis of python program helps to understand problems.
CST362.CO2-PO3	H	The knowledge in if-else ,while,for loops helps in designing solutions for complex engineering problems.
CST362.CO2-PO12	H	The knowledge in control statements helps in software industry.
CST362.CO2-PSO1	H	Apply fundamental concepts in control statements to solve problems

CST362.CO2-PSO3	H	Students will be able to provide innovative solutions to novel problems with the knowledge gained from various control structures.
CST362.CO3-PO1	H	The knowledge in list,tuple,dictionaries language helps to solve problems.
CST362.CO3-PO2	H	The analysis of these datastructures helps to understand problems.
CST362.CO3-PO3	H	The knowledge in list,tuple ,dictionary helps in designing solutions for complex engineering problems.
CST362.CO3-PO4	M	The knowledge in list,tuple ,dictionary helps in designing solutions for complex projects.
CST362.CO3-PO5	M	Modern IDES used to implement programming
CST362.CO3-PO12	H	The knowledge in list,tuple,dictionary helps in software industry.
CST362.CO3-PSO1	H	Apply data structures to solve problems.
CST362.CO3-PSO3	H	Students will be able to provide innovative solutions to novel problems with the knowledge gained from various data structures
CST362.CO4-PO1	H	The knowledge in turtle helps to create GUI.
CST362.CO4-PO2	H	The analysis of these various built in functions helps to understand problems.
CST362.CO4-PO3	H	The knowledge in event driven programming helps to design interface.
CST362. CO4-PO4	M	The knowledge in event driven programming helps in designing solutions for complex projects.

CST362. CO4-PO5	M	Modern IDES used to implement programming
CST362.CO4-PO12	H	The knowledge in GUI helps to create interface in software projects.
CST362.CO4-PSO1	H	Apply graphical user interface to solve problems
CST362.CO4-PSO3	H	Students will be able to provide innovative solutions to novel problems with the knowledge gained from various event driven programming.
CST362.CO5-PO1	H	The knowledge in oops helps to solve problems.
CST362.CO5-PO2	H	The analysis of python program helps to understand problems.
CST362.CO5-PO3	H	Knowledge in object oriented programming concepts helps in designing solutions for complex problems.
CST362.CO5-PO4	H	The knowledge in oops helps in designing solutions for complex projects
CST362.CO5-PO5	H	Modern ides used to implement programming.
CST362.CO5-PO12	H	The knowledge in python helps in software industry.
CST362.CO5-PSO1	H	Apply concepts of oops to solve problems.
CST362.CO5-PSO3	H	Students will be able to provide innovative solutions to novel problems with the knowledge gained from various object oriented programming.
CST362.CO6-PO1	H	The knowledge in pandas,numpy,matplotlib helps to solve problems
CST362.CO6-PO2	H	The analysis of python programs helps to understand problems.
CST362.CO6-PO3	H	The knowledge in pandas,numpy,matplotlib helps in designing solutions for complex engineering

		problems.
CST362.CO6-PO4	H	Compare various issues in different methods
CST362.CO6-PO5	H	Modern IDES used to implement programming
CST362.CO6-PO6	H	The knowledge in pandas,numpy,matplotlib helps in designing solutions that help society
CST362.CO6-PO12	H	The knowledge in python helps in software indrustry
CST362.CO6-PSO1	H	Apply the knowledge to find hidden data
CST362.CO6-PSO3	H	Students will be able to provide innovative solutions to novel problems with the knowledge gained from various data processing.

Programme : Bachelor of Technology | Course Code: CST 302
Course Name: Compiler Design | Semester: 6

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CO1	Explain the phases in compilation process (lexical analysis, syntax analysis, semantic analysis, intermediate code generation, code optimization and code generation) and model a lexical analyser.	Applying(P)
CO2	Model language syntax using Context Free Grammar and develop parse tree representation using leftmost and rightmost derivations	Applying(P)
CO3	Compare different types of parsers(Bottom-up and Top-down) and construct parser for a given grammar	Applying(P)
CO4	Build Syntax Directed Translation for a context free grammar, compare various storage allocation strategies and classify intermediate representations	Applying(P)
CO5	Illustrate code optimization and code generation techniques in compilation	Applying(P)

CO - PO - PSO MAPPING

CO-PO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	-	-	-	-	3	-	1	2
CO2	3	3	3	3	1	-	-	-	-	-	-	3	1	-	2
CO3	3	3	3	3	1	-	-	-	-	-	-	3	1	-	2
CO4	3	3	3	3	-	-	-	-	-	-	-	3	1	-	2
CO5	3	3	3	3	-	-	-	-	-	-	-	3	1	-	2
AVG	3	3	3	3	2							3	1	1	2

Correlation : 1-Low, 2-moderate, 3-high, No Correlation '-'

JUSTIFICATION

CO-PO	LEVEL (Low/ Moderate/ High)	JUSTIFICATION
CO1-PO1	HIGH	By explaining the phases in compilation process and modelling a lexical analyser, the students will be able to develop engineering knowledge.
CO1-PO2	HIGH	By explaining the phases in compilation process and modelling a lexical analyser, the students will be able to do problem analysis
CO1-PO3	HIGH	By explaining the phases in compilation process and modelling a lexical analyser, the students will be able to design a lexical analyser
CO1-PO4	HIGH	By explaining the phases in compilation process and modelling a lexical analyser, the students will be able to conduct investigations of complex problems and provide valid conclusions
CO1-PO5	HIGH	By explaining the phases in compilation process and modelling a lexical analyser, the students will be able to use modern tools
CO1-PO12	HIGH	By explaining the phases in compilation process and modelling a lexical analyser, the students will be able to do lifelong learning.
CO1-PSO2	LOW	By explaining the phases in compilation process and modelling a lexical analyser, students will be able to develop quality software for designing process of compilation
CO1-PSO3	LOW	By explaining the phases in compilation process and modelling a lexical analyser, students will be able to adapt to emerging information and communication technologies
CO2-PO1	HIGH	By modelling language syntax using Context Free Grammar and developing parse tree representation using leftmost and rightmost derivations, students will be able to develop engineering knowledge.
CO2-PO2	HIGH	By modelling language syntax using Context Free Grammar and developing parse tree representation using leftmost and rightmost derivations , students will be able to do problem analysis

CO2-PO3	HIGH	By modelling language syntax using Context Free Grammar and developing parse tree representation using leftmost and rightmost derivations , students will be able to develop solutions
CO2-PO4	HIGH	By modelling language syntax using Context Free Grammar and developing parse tree representation using leftmost and rightmost derivations , students will be able to conduct investigations of complex problems and provide valid conclusions
CO2-PO5	HIGH	By modelling language syntax using Context Free Grammar and developing parse tree representation using leftmost and rightmost derivations, students will be able to use modern tools.
CO2-PO12	HIGH	By modelling language syntax using Context Free Grammar and developing parse tree representation using leftmost and rightmost derivations, the students will be able to do lifelong learning.
CO2-PSO1	LOW	By modelling language syntax using Context Free Grammar and developing parse tree representation using leftmost and rightmost derivations, students will be able to do a few analyze, design and develop computing solutions.
CO2-PSO3	LOW	By modelling language syntax using Context Free Grammar and developing parse tree representation using leftmost and rightmost derivations, students will be able to adapt a few to emerging information and communication technologies.
CO3-PO1	HIGH	By comparing different types of parsers (Bottom-up and Top-down) and constructing parser for a given grammar, students will be able to develop engineering knowledge.
CO3-PO2	HIGH	By comparing different types of parsers(Bottom-up and Top-down) and constructing parser for a given grammar, students will be able to do problem analysis
CO3-PO3	HIGH	By comparing different types of parsers(Bottom-up and Top-down) and constructing parser for a given grammar, students will be able to develop solutions
CO3-PO4	HIGH	By comparing different types of parsers(Bottom-up and Top-down) and constructing parser for a given grammar, students will be able to conduct investigations of complex problems and provide valid conclusions

CO3-PO5	HIGH	By comparing different types of parsers(Bottom-up and Top-down) and constructing parser for a given grammar, students will be able to use modern tools.
CO3-PO12	HIGH	By comparing different types of parsers(Bottom-up and Top-down) and constructing parser for a given grammar, the students will be able to do lifelong learning.
CO3-PSO1	LOW	By comparing different types of parsers(Bottom-up and Top-down) and constructing parser for a given grammar, students will be able to do a few analyze, design and develop computing solutions
CO3-PSO2	LOW	By comparing different types of parsers(Bottom-up and Top-down) and constructing parser for a given grammar, students will be able to do adapt a few to emerging information and communication technologies
CO4-PO1	HIGH	By building Syntax Directed Translation for a context free grammar, comparing various storage allocation strategies and classifying intermediate representations , students will be able to develop engineering knowledge.
CO4-PO2	HIGH	By building Syntax Directed Translation for a context free grammar, comparing various storage allocation strategies and classifying intermediate representations ,students will be able to do problem analysis
CO4-PO3	HIGH	By building Syntax Directed Translation for a context free grammar, comparing various storage allocation strategies and classifying intermediate representations ,students will be able to develop solutions
CO4-PO4	HIGH	By building Syntax Directed Translation for a context free grammar, comparing various storage allocation strategies and classifying intermediate representations ,students will be able to conduct investigations of complex problems and provide valid conclusions.
CO4-PO12	HIGH	By building Syntax Directed Translation for a context free grammar, comparing various storage allocation strategies and classifying intermediate representations, the students will be able to do lifelong learning.
CO4-PSO1	LOW	By building Syntax Directed Translation for a context free grammar, comparing various storage allocation strategies and

		classifying intermediate representations ,students will be able to do a few analyze, design and develop computing solutions
CO4-PSO2	LOW	By building Syntax Directed Translation for a context free grammar, comparing various storage allocation strategies and classifying intermediate representations ,students will be able to do adapt a few to emerging information and communication technologies
CO5-PO1	HIGH	By illustrating code optimization and code generation techniques in compilation, the students will be able to develop engineering knowledge
CO5-PO2	HIGH	By illustrating code optimization and code generation techniques in compilation, the students will be able to do problem analysis
CO5-PO3	HIGH	By illustrating code optimization and code generation techniques in compilation, the students will be able to develop solutions
CO5-PO4	HIGH	By illustrating code optimization and code generation techniques in compilation, the students will be able to conduct investigations of complex problems and provide valid conclusions.
CO5-PO12	HIGH	By illustrating code optimization and code generation techniques in compilation, the students will be able to do lifelong learning
CO5-PSO1	LOW	By illustrating code optimization and code generation techniques in compilation, students will be able to do a few analyze, design and develop computing solutions
CO5-PSO2	LOW	By illustrating code optimization and code generation techniques in compilation, students will be able to do adapt a few to emerging information and communication technologies

Programme: Bachelor of Technology Course Code: CSL 332

Course Name: Networking Lab Semester: 6

COURSE OUTCOMES

After the completion of the course the student will be able to

CO	Statement	K LEVEL
CO1	Use network related commands and configuration files in Linux Operating System. (Cognitive Knowledge Level:Understand)	K2
CO2	Develop network application programs and protocols. (Cognitive Knowledge Level:Apply)	K3
CO3	Analyze network traffic using network monitoring tools. (Cognitive Knowledge Level:Apply)	K3
CO4	Design and setup a network and configure different network protocols. (Cognitive Knowledge Level:Apply)	K3
CO5	Develop simulation of fundamental network concepts using a network simulator. (Cognitive Knowledge Level:Apply)	K3

CO-PO-PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	3	-	1	-	3	2	2	2
CO2	3	3	2	2	-	-	-	3	-	1	-	3	3	2	-
CO3	3	3	3	2	2	-	-	3	-	1	-	3	3	1	-
CO4	3	3	3	2	2	2	-	2	-	1	-	3	3	2	2
CO5	3	3	3	2	2	-	-	3	-	1	-	3	3	2	-
Average	3	3	3	2	2	2	-	3	-	1	-	3	3	2	2

Correlation High:3 Medium :2 Low:1 No correlation: -

JUSTIFICATION

MAPPING	LOW/MEDIUM/HIGH	JUSTIFICATION
CSL332.CO1-PO1	H	Students have ability to Use network related commands and configuration files in Linux Operating System.
CSL332.CO1-PO2	H	Students are able to identify the basic structure and functional units of Use network related commands and configuration files in Linux Operating System.
CSL332.CO1-PO3	H	Students are able to apply reasoning informed by the configuration files in Linux Operating System.
CSL332.CO1-PO8	H	Students can communicate effectively by presenting the functionalities of network related commands.
CSL332.CO1-PO10	H	Students can recognize the need for the digital computer and gain the ability to engage in independent and lifelong learning in the functionalities of a network.
CSL332.CO1-PO12	L	Students can develop computing solutions in functionality of a network related commands in Computer Science and Engineering.
CSL332.CO1-PSO1	H	Students are able to apply reasoning informed by the contextual knowledge to assess the functions of files in Linux Operating System.
CSL332.CO1-PSO2	M	Students have ability to apply files in Linux Operating System and network related commands and configuration files in Linux Operating System.
CSL332.CO1-PSO3	M	Students are able to formulate the applications and use network related commands and configuration files in Linux Operating System.
CSL332.CO2-PO1	H	Students have ability to develop network application programs and protocols.

CSL332.CO2-PO2	H	Students have ability to develop network application programs.
CSL332.CO2-PO3	M	Develop network application programs such as Socket programming.
CSL332.CO2-PO4	M	Students have ability to develop client –server communication programs.
CSL332.CO2- PO8	H	Develop client –server communication programs.
CSL332.CO2- PO10	L	Students are able to formulate the network applications
CSL332.CO2- PO12	H	Students are able to formulate the network protocols.
CSL332.CO2- PSO1	H	Develop network application programs such as Socket programming
CSL332.CO2- PSO2	M	Students have ability to develop client –server communication programs.
CSL332.CO3- PO1	H	Students have ability to analyze network traffic using network monitoring tools such as wireshark.
CSL332.CO3- PO2	H	Students have ability to analyze network traffic using network monitoring tools such as wire shark and applications
CSL332.CO3- PO3	H	Students have ability to analyze network traffic using network monitoring tools
CSL332.CO3- PO4	M	Students are able to identify analyze network traffic using network monitoring tools
CSL332.CO3- PO5	M	Students can communicate effectively while designing the basic structure of processing unit using the concepts network monitoring tools.
CSL332.CO3-PO8	M	Students have ability to analyse network traffic using network monitoring tools.
CSL332.CO3-PO10	L	Students have ability to analyse network traffic using network monitoring tools wireshark.

CSL332.CO3-PO12	M	Students have ability to analyze network traffic using network monitoring tools
CSL332.CO3-PSO1	M	Students can communicate effectively while designing the network monitoring tools
CSL332.CO3-PSO2	L	Students can communicate effectively while designing the network monitoring tools such as wireshark.
CSL332.CO4-PO1	H	Students have ability to design and setup a network and configure different network protocols.
CSL332.CO4-PO2	H	Students have ability to design and setup a network and configure different network protocols FTP
CSL332.CO4-PO3	H	Students are able to setup a network and configure different network protocols FTP
CSL332.CO4-PO4	M	Students are able to formulate different network protocols.
CSL332.CO4-PO5	M	Students are able to formulate different network protocols smtp.
CSL332.CO4-PO6	M	Students are able to formulate different network protocols DNS.
CSL332.CO4-PO8	M	Students are able to formulate different network protocols ftp.
CSL332.CO4-PO10	L	Students have ability to design and setup a network and configure different network protocols.
CSL332.CO4-PO12	H	Students are able to formulate different network protocols.
CSL332.CO4-PSO1	H	Students are able to formulate different network protocols SMTP.
CSL332.CO4-PSO2	M	Students have ability to design and setup a network and configure different network protocols.
CSL332.CO4-PSO3	M	Students are able to formulate different network protocols.
CSL332.CO5-PO1	H	Students are able to Develop simulation of fundamental network concepts using a network simulator.

CSL332.CO5-PO2	H	Students have ability to develop simulation of fundamental network concepts using a network simulator.
CSL332.CO5-PO3	H	Students are able to formulate network concepts using a network simulator.
CSL332.CO5-PO4	M	Students are able to formulate and develop simulation fundamental network concepts .
CSL332.CO5-PO5	M	Students can communicate effectively by to develop simulation of fundamental network concepts using a network simulator
CSL332.CO5-PO8	H	Students have ability to develop simulation of fundamental network concepts using a network simulator
CSL332.CO5-PO10	L	Students are able to Develop simulation of fundamental network concepts using a network simulator.
CSL332.CO5-PO12	H	Students are able to formulate network concepts using a network simulator.
CSL332.CO5-PSO1	H	Students are able to Develop simulation of fundamental network concepts.
CSL332.CO5-PSO2	M	Students have ability to develop simulation of fundamental network concepts using a network simulator.

Programme : Bachelor of Technology Course Code: CST 304
Course Name: Computer Graphics and Image Processing Semester: 6

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CO1	Describe the working principles of graphics devices	Understanding(U)
CO2	Illustrate line drawing, circle drawing and polygon filling algorithms	Applying(P)
CO3	Demonstrate geometric representations, transformations on 2D & 3D objects,clipping algorithms and projection algorithms	Applying(P)
CO4	Summarize visible surface detection methods	Understanding(U)
CO5	Summarize the concepts of digital image representation, processing and demonstrate pixel relationships	Applying(P)
CO6	Solve image enhancement and segmentation problems using spatial domaintechniques	Applying(P)

CO - PO - PSO MAPPING

CO - PO	Programme outcomes												PSO		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CO2	3	3	3	1	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	1	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO6	3	1	2	1	-	1	-	-	-	-	-	-	-	-	2
AVG	2.7	2.5	2.8	1.6		1.0									1.5

Correlation : 1-Low, 2-moderate, 3-high, No Correlation '-'

JUSTIFICATION

CO-PO	LEVEL (Low/ Moderate/ High)	JUSTIFICATION
CO1-PO1	LOW	Students will be able to understand the basic working principles of graphics devices
CO1-PSO3	LOW	Students will be able to understand the concepts of computer graphics and the devices used.
CO2-PO1	HIGH	Students can analyzing various algorithms of circle and line drawing by considering principles of mathematics.
CO2-PO2	HIGH	Students can use the algorithms to design various graphics applications
CO2-PO3	HIGH	Students will be able to understand the concepts of drawing basic primitives like line, circle etc.
CO2-PO4	LOW	Students will get the ability to acquire programming efficiency by studying the basic primitive drawing algorithms in software project development
CO3-PO1	HIGH	Students will be able to apply the basics of mathematics to study the concepts of geometric transformation on objects.
CO3-PO2	HIGH	Students can design graphics applications like animation by applying the transformation steps on objects.
CO3-PO3	HIGH	Students will be able to understand the concepts transformation on 2d and 3d objects
CO3-PO4	LOW	Students can apply mathematics and engineering fundamentals to study the concept of clipping.
CO4-PO1	HIGH	Students will be able to understand the basic concepts in visible surface detection techniques.
CO4-PO3	HIGH	Students can analyze various surface detection techniques and able to understand the concept of eliminating hidden surface
CO5-PO1	HIGH	Students will be able to understand the basic concept of image processing and its application by using the basic engineering

		and mathematics principles.
CO5-PO2	HIGH	Students can design various image processing application system using the basic knowledge on image processing
CO5-PO3	HIGH	Students will be able to use image processing
CO5-PO4	MODERATE	Students will be able to use image processing tools like MATLAB, OpenCV to design application programs.
CO6-PO1	HIGH	Students will be able to do image enhancement and segmentation
CO6-PO2	LOW	Students will be able to do image segmentation in spatial doman.
CO6-PO3	MODERATE	Students will be able to design and develop innovative products by applying the concepts of image processing.
CO6-PO4	LOW	Students will be able to understand the concepts of image processing techniques.
CO6-PO6	LOW	Students will be able to understand the concepts of image processing techniques.
CO6-PSO3	MODERATE	Students will be able to design and develop innovative products by applying the concepts of image processing.

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Programme : Bachelor of Technology
Course Name: Mini Project

Course Code: CSD 334
Semester: 6

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CSD334.1	Identify technically and economically feasible problems (Cognitive Knowledge Level: Apply)	K3
CSD334.2	Identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes.(Cognitive Knowledge Level: Apply)	K3
CSD334.3	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques (Cognitive Knowledge Level: Apply)	K3
CSD334.4	Prepare technical report and deliver presentation.(Cognitive Knowledge Level: Apply)	K3
CSD334.5	Apply engineering and management principles to achieve the goal of the project. (Cognitive Knowledge Level: Apply)	K3

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	3	3	3	3	3	3	3	2	-	-
CO2	3	3	3	3	3	3	-	3	3	3	3	3	2	-	-
CO3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	-
CO4	2	3	3	2	2	-	-	2	3	3	2	3	-	-	-
CO5	3	3	3	3	3	3	3	3	3	-	3	3	-	-	-
AVG	2.8	3	3	2.6	2.75	3	3	2.8	3	3	2.8	3	2	3	-

Correlation : 1-Low, 2-Moderate, 3-High, No Correlation '-'

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JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
CSD334.1-PO1	H	By Identify technically and economically feasible problems, students are able to apply the knowledge for the solution of engineering problems.
CSD334.1-PO2	H	By Identify technically and economically feasible problems, students are able to analyse the engineering problems.
CSD334.1-PO3	H	By Identify technically and economically feasible problems, the students are able to design system components.
CSD334.1-PO4	M	By Identify technically and economically feasible problems, students are able to conduct design of experiments, analysis and interpretation of data to provide valid conclusions
CSD334.1-PO6	H	By Identify technically and economically feasible problems, the students are able to apply reasoning informed by the contextual knowledge to assess societal issues and responsibilities relevant to the professional engineering practice.
CSD334.1-PO7	H	By Identify technically and economically feasible problems, the students are able to understand the impact of the professional engineering solutions in societal and environmental contexts and to demonstrate the knowledge of and the need for sustainable development.
CSD334.1-PO8	H	By Identify technically and economically feasible problems, students are able to apply ethical principles and commit to professional ethics and

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		responsibilities and norms of the engineering practice
CSD334.1-PO9	H	By Identify technically and economically feasible problems, the students are able to function effectively as an individual, or a team leader in diverse or multi-disciplinary settings.
CSD334.1-PO10	H	By Identify technically and economically feasible problems, the students are able to communicate effectively on complex engineering activities with engineering community, able to comprehend effectively give and receive clear instructions, write effective reports, design documentation and make effective presentations
CSD334.1-PO11	H	By Identify technically and economically feasible problems, the students are able to understand the engineering and management principles, demonstrate knowledge in multi-disciplinary environments
CSD334.1-PO12	H	By Identify technically and economically feasible problems, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change.
CSD334.1-PSO1	M	Students will be able to analyse, design and develop computing solutions with the knowledge of the problem requirements for design solution based on professional ethics and develop strong problem analysis skills.
CSD334.2-PO1	H	By Identifying and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes, students are able to apply the

		knowledge for the solution of engineering problems.
CSD334.2-PO2	H	By Identifying and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes, students are able to analyse the engineering problems.
CSD334.2-PO3	H	By Identifying and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes, the students are able to design system components.
CSD334.2-PO4	H	By Identifying and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes, students are able to conduct design of experiments, analysis and interpretation of data to provide valid conclusions
CSD334.2-PO5	H	By Identifying and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes, the students are able to use modern tools to engineering activities with an understanding of the limitations.
CSD334.2-PO6	H	By Identifying and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes, the students are able to apply reasoning informed by the contextual knowledge to assess societal issues and responsibilities relevant to the professional engineering practice.
CSD334.2-PO8	H	By Identifying and survey the relevant literature for getting exposed to related solutions and get

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		familiarized with software development processes, students are able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
CSD334.2-PO9	H	By Identifying and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes, the students are able to function effectively as an individual, or a team leader in diverse or multi-disciplinary settings.
CSD334.2-PO10	H	By Identifying and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes, the students are able to communicate effectively on complex engineering activities with engineering community, able to comprehend effectively give and receive clear instructions, write effective reports, design documentation and make effective presentations
CSD334.2-PO11	H	By Identifying and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes, , the students are able to understand the engineering and management principles, demonstrate knowledge in multi-disciplinary environments
CSD334.2-PO12	H	By Identifying and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change

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CSD334.2-PSO1	M	Students will be able to analyse, design and develop computing solutions with the knowledge about engineering and social aspects of design of products while identifying problems and arriving at innovative solutions for problems
CSD334.3-PO1	H	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques, students are able to apply the knowledge for the solution of engineering problems.
CSD334.3-PO2	H	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques, students are able to analyse the engineering problems.
CSD334.3-PO3	H	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques, the students are able to design system components.
CSD334.3-PO4	M	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques, students are able to conduct design of experiments, analysis and interpretation of data to provide valid conclusions
CSD334.3-PO5	H	Perform requirement analysis, identify design methodologies and develop adaptable &

		reusable solutions of minimal complexity by using modern tools & advanced programming techniques, students are able to use modern tools to engineering activities with an understanding of the limitations.
CSD334.3-PO6	H	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques, the students are able to apply reasoning informed by the contextual knowledge to assess societal issues and responsibilities relevant to the professional engineering practice.
CSD334.3-PO7	H	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques, the students are able to understand the impact of the professional engineering solutions in societal and environmental contexts and to demonstrate the knowledge of and the need for sustainable development.
CSD334.3-PO8	H	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques, students are able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
CSD334.3-PO9	H	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming

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		techniques, the students are able to function effectively as an individual, or a team leader in diverse or multi-disciplinary settings.
CSD334.3-PO10	H	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques, the students are able to communicate effectively on complex engineering activities with engineering community, able to comprehend effectively give and receive clear instructions, write effective reports, design documentation and make effective presentations
CSD334.3-PO11	H	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques, the students are able to understand the engineering and management principles, demonstrate knowledge in multi-disciplinary environments.
CSD334.3-PO12	H	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CSD334.3-PSO1	M	Students will be able to analyse, design and develop computing solutions with the knowledge of development of components, products, process or technologies by applying

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		techniques, the students are able to function effectively as an individual, or a team leader in diverse or multi-disciplinary settings.
CSD334.3-PO10	H	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques, the students are able to communicate effectively on complex engineering activities with engineering community, able to comprehend effectively give and receive clear instructions, write effective reports, design documentation and make effective presentations
CSD334.3-PO11	H	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques, the students are able to understand the engineering and management principles, demonstrate knowledge in multi-disciplinary environments.
CSD334.3-PO12	H	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CSD334.3-PSO1	M	Students will be able to analyse, design and develop computing solutions with the knowledge of development of components, products, process or technologies by applying

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		the fundamental concepts and engineering principles.
CSD334.3-PSO2	H	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge of development of components, products, process or technologies by applying the fundamental concepts and engineering principles.
CSD334.4-PO1	M	Prepare technical report and deliver presentation, students are able to apply the knowledge for the solution of engineering problems.
CSD334.4-PO2	H	Prepare technical report and deliver presentation, students are able to analyse the engineering problems.
CSD334.4-PO3	H	Prepare technical report and deliver presentation, the students are able to design system components.
CSD334.4-PO4	M	Prepare technical report and deliver presentation, students are able to conduct design of experiments, analysis and interpretation of data to provide valid conclusions
CSD334.4-PO5	M	Prepare technical report and deliver presentation, students are able to use modern tools to engineering activities with an understanding of the limitations.
CSD334.4-PO8	M	Prepare technical report and deliver presentation, students are able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

CSD334.4-PO9	H	Prepare technical report and deliver presentation, the students are able to function effectively as an individual, or a team leader in diverse or multi-disciplinary settings.
CSD334.4-PO10	H	Prepare technical report and deliver presentation, the students are able to communicate effectively on complex engineering activities with engineering community, able to comprehend effectively give and receive clear instructions, write effective reports, design documentation and make effective presentations
CSD334.4-PO11	M	Prepare technical report and deliver presentation, the students are able to understand the engineering and management principles, demonstrate knowledge in multi-disciplinary environments
CSD334.4-PO12	H	Prepare technical report and deliver presentation, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CSD334.5-PO1	H	Apply engineering and management principles to achieve the goal of the project, the students are able to apply the knowledge for the solution of engineering problems.
CSD334.5-PO2	H	Apply engineering and management principles to achieve the goal of the project, the students are able to analyse the engineering problems.
CSD334.5-PO3	H	Apply engineering and management principles to achieve the goal of the project, the students are able to design system components.
CSD334.5-PO4	H	Apply engineering and management principles to achieve the goal of the project, the students

		are able to conduct design of experiments, analysis and interpretation of data to provide valid conclusions
CSD334.5-PO5	H	Apply engineering and management principles to achieve the goal of the project, the students are able to use modern tools to engineering activities with an understanding of the limitations.
CSD334.5-PO6	H	Apply engineering and management principles to achieve the goal of the project, the students are able to apply reasoning informed by the contextual knowledge to assess societal issues and responsibilities relevant to the professional engineering practice.
CSD334.5-PO7	H	Apply engineering and management principles to achieve the goal of the project, the students are able to understand the impact of the professional engineering solutions in societal and environmental contexts and to demonstrate the knowledge of and the need for sustainable development.
CSD334.5-PO8	H	Apply engineering and management principles to achieve the goal of the project, the students are able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
CSD334.5-PO9	H	Apply engineering and management principles to achieve the goal of the project, the students are able to function effectively as an individual, or a team leader in diverse or multi-disciplinary settings.
CSD334.5-PO11	H	Apply engineering and management principles to achieve the goal of the project, the students are able to understand the engineering and

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		management principles, demonstrate knowledge in multi-disciplinary environments
CSD334.5-PO12	H	Apply engineering and management principles to achieve the goal of the project, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change

Prepared by

SMITHA JACOB

Course handling Faculty

& Course Coordinator

Verified by

HOD
SARJU.S

PAC Member

Approved by

Signature of HOD

SEMESTER 7

Department of Computer Science and Engineering

Programme: Bachelor of Technology Course Code: MCN 401

Course Name: Industrial Safety Engineering Semester: 7, 2019 Scheme

COURSE OUTCOMES

After completion of this course, the students will be able to:

CO	Statement	Knowledge level
CO 1	Describe the theories of accident causation and preventive measures of industrial accidents. (Cognitive Knowledge level: Understand)	K2
CO 2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping. (Cognitive Knowledge level: Understand)	K2
CO 3	Explain different issues in construction industries. (Cognitive Knowledge level: Understand)	K2
CO 4	Describe various hazards associated with different machines and mechanical material handling. (Cognitive Knowledge level: Understand)	K2
CO 5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards. (Cognitive Knowledge level: Apply)	K3

CO-PO MAPPING

B.Tech Semester – S7

MCN 401 — INDUSTRIAL SAFETY ENGINEERING

COs/POs	PO1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	-	-	-	2	2	2	-	-	-	1	2	2	1
CO2	2	1	2	-	1	1	1	1	-	-	-	1	2	2	1
CO3	2	2	2	-	1	1	1	1	1	1	-	1	2	2	1
CO4	2	2	2	-	1	1	1	1	1	1	-	1	2	2	1
CO5	2	2	2	1	1	1	1	1	1	1	-	1	2	2	1
Average	2	1.8	2	1	1	1.2	1.2	1.2	1	1	-	1	2	2	1

Correlation : 1-Low, 2-Moderate, 3-High, No Correlation '-'

CO-PO-PSO Mapping justification

CO	PO/PSO	Level	Justification
CO1	PO1	2	Knowledge of accident causation theories and preventive measures is required to safely conduct all activities such as problem solving in engineering
	PO2	2	Knowledge of accident causation theories and preventive measures is required to conduct all engineering activities involving identifying and analysing a system
	PO6	2	Knowledge of accident causation theories and preventive measures is required to assess societal health and safety issues and provide engineering solutions
	PO7	2	Knowledge of accident causation theories and preventive measures is required to provide a safe and sustainable environment
	PO8	2	Knowledge of accident causation theories and following safety measures is required as part of work ethics
	PO12	1	Safety is inevitable in a work environment and is a lifelong learning process
	PSO1	2	Knowledge of accident causation theories and preventive measures is required to design and maintain engineering systems with due consideration for safety
	PSO2	2	Knowledge of accident causation theories and preventive measures is required to derive safe and sustainable solutions to engineering problems
	PSO3	1	Safety is inevitable in a work environment and involves lifelong learning
CO2	PO1	2	Knowledge of various PPEs, safety performance indicators and importance of housekeeping is required to safely conduct all engineering problem
	PO2	1	Knowledge of various PPEs, safety performance indicators and importance of housekeeping will help in safely conducting engineering activities involving identifying and analysing a system
	PO3	2	Knowledge of safety performance indicators and importance of housekeeping are all required while designing an engineering system
	PO5	1	Knowledge of various PPEs, safety performance indicators and importance of housekeeping will help in selecting and using modern safety tools
	PO6	1	Knowledge of various safety performance indicators will help in assessing societal health and safety issues and provide engineering solutions
	PO7	1	Knowledge of various PPEs, safety performance indicators and importance of housekeeping will help in providing a safe and sustainable environment
	PO8	1	Knowledge of various PPEs, safety performance indicators and importance of housekeeping will help in inculcating work ethics
	PO12	1	Safety is inevitable in a work environment and is a lifelong learning process
	PSO1	2	Knowledge of various PPEs, safety performance indicators and importance of housekeeping is required to design and maintain an engineering system with due consideration for safety
	PSO2	2	Knowledge of various PPEs, safety performance indicators and importance of housekeeping is required to derive safe and sustainable solutions to engineering problems
	PSO3	1	Safety is inevitable in a work environment and involves lifelong learning
CO3	PO1	2	Knowledge of different safety issues in construction industry is required to safely conduct all engineering activities such as problem solving
	PO2	2	Knowledge of different safety issues in construction industry is required to safely conduct all engineering activities involving identifying and analysing a system or process
	PO3	2	Knowledge of different safety issues in construction industry is required to design an engineering process or system with due consideration for safety

	PO5	1	Knowledge of different safety issues in construction industry will help in selecting and using modern safety tools and equipment
	PO6	1	Knowledge of different safety issues in construction industry will help in assessing the societal health and safety issues and provide solutions to it
	PO7	1	Knowledge of different safety issues in construction industry and following preventive measures will help in providing a safe and sustainable environment
	PO8	1	Knowledge of different safety issues in construction industry and following their control measures will help in inculcating work ethics in construction workers
	PO9	1	Knowledge of different safety issues in construction industry will help workers to work better individually as well as in a team
	PO10	1	Communication of safety issues and the control measures will help in providing a safe environment at the work place
	PO12	1	Safety is inevitable in a work environment and is a lifelong learning process
	PSO1	2	Knowledge of different safety issues in construction industry is required to design and maintain engineering equipments in construction industry with due consideration for safety
	PSO2	2	Knowledge of different safety issues in construction industry is required to derive safe and sustainable solutions to engineering problems in construction processes
	PSO3	1	Safety is inevitable in a work environment and involves lifelong learning
CO4	PO1	2	Knowledge of safety hazards in general machines and material handling machines is required to safely solve an engineering problem
	PO2	2	Knowledge of safety hazards in general machines and material handling machines is required to safely analyse an engineering problem
	PO3	2	Knowledge of safety hazards in general machines and material handling machines is required to design an engineering system with due consideration for safety
	PO5	1	Knowledge of safety hazards in general machines and material handling machines will help in selecting and using modern safety tools
	PO6	1	Knowledge of safety hazards in general machines and material handling machines will help in assessing the societal health and safety issues and provide solutions to it
	PO7	1	Knowledge of safety hazards in general machines and material handling machines will help in providing a safe and sustainable environment
	PO8	1	Knowledge of safety hazards in general machines, material handling machines and following their control measures will help in inculcating work ethics in workers
	PO9	1	Knowledge of safety hazards in general machines and material handling machines will help workers to work better individually as well as in a team
	PO10	1	Communication of safety issues and control measures will help provide a safe environment at the work place
	PO12	1	Safety is inevitable in a work environment and is a lifelong process
	PSO1	2	Knowledge of safety hazards in general machines and material handling machines is required to design and maintain engineering systems with due consideration for safety
	PSO2	2	Knowledge of safety hazards in general machines and material handling machines is required to derive safe and sustainable solutions in material handling equipment and other machines
	PSO3	1	Safety is inevitable in a work environment and involves lifelong learning
CO5	PO1	2	Knowledge of hazards identification tools and various chemical hazards is required to safely conduct all engineering activities such as problem solving especially in a chemical industry

	PO2	2	Knowledge of hazards identification tools and various chemical hazards is required to safely conduct all engineering activities such as identifying and analysing an engineering problem
	PO3	2	Knowledge of hazards identification tools and various chemical hazards is required to safely design an engineering process or system
	PO4	1	Knowledge of hazards identification tools and various chemical hazards will help in investigating a hazardous process for its safety issues
	PO5	1	Knowledge of hazards identification tools and various chemical hazards will help in selecting and using modern safety tools
	PO6	1	Knowledge of hazards identification tools and various chemical hazards will help in assessing the societal health and safety issues and provide solutions to it
	PO7	1	Knowledge of hazards identification tools and various chemical hazards will help in providing a safe and sustainable environment
	PO8	1	Knowledge of hazards identification tools, various chemical hazards and following their control measures will help in inculcating work ethics in workers
	PO9	1	Knowledge of hazards identification tools and various chemical hazards will help workers to work individually as well as in a team
	PO10	1	Communication of safety issues and control measures will help provide a safe environment at the work place
	PO12	1	Safety is inevitable in a work environment and involves lifelong learning
	PSO1	2	Knowledge of hazards identification tools and various chemical hazards is required to identify hazards in designing, commissioning and maintaining an engineering system
	PSO2	2	Knowledge of hazards identification tools and various chemical hazards is required to derive safe and sustainable solutions to hazardous engineering processes that may or may not involve chemicals
	PSO3	1	Safety is inevitable in a work environment and involves lifelong learning

Programme: Bachelor of Technology
Course Code: CST401
Course Name: Artificial Intelligence
Semester: 7

COURSE OUTCOMES

Course Outcomes: After the completion of the course the student will be able to

CO#	CO
CO1	Explain the fundamental concepts of intelligent systems and their architecture. **(Cognitive Knowledge Level: Understanding)**
CO2	Illustrate uninformed and informed search techniques for problem solving in intelligent systems. **(Cognitive Knowledge Level: Understanding)**
CO3	Solve Constraint Satisfaction Problems using search techniques. **(Cognitive Knowledge Level: Apply)**
CO4	Represent AI domain knowledge using logic systems and use inference techniques for reasoning in intelligent systems. **(Cognitive Knowledge Level: Apply)**
CO5	Illustrate different types of learning techniques used in intelligent systems **(Cognitive Knowledge Level: Understand)**

CO - PO - PSO MAPPING

CO	Programme Outcomes(PO)												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSL331.CO1	3	-	-	-	-	-	-	-	-	--	-	-	3	-	-
CSL331.CO2	3	3	-	-	-	-	-	-	-	--	-	3	-	-	-
CSL331.CO3	3	3	2	2	-	-	-	-	-	-	-	3	-	-	-
CSL331.CO4	3	3	2	2	-	-	-	-	-	-	-	3	-	-	-
CSL331.CO5	3	3	-	-	2	-	-	-	-	-	-	3	-	-	-
Average	3	3	2	2	2							3	3		

Correlation : 1-Low, 2-moderate, 3-high, No Correlation '-'

JUSTIFICATION

SNO	PO/PSO MAPPED	JUSTIFICATION
CST401.1	PO1	Students will be able to understand basics of Artificial intelligence and its applications
CST401.1	PSO1	Students will be able to employability skills in emerging area of Computer science
CST401.2	PO1	Students will be able to understand concept of searching
CST401.2	PO2	Students will be able to analyse complex AI problems and solve them
CST401.2	PO12	Students will be able to apply the problem-solving skills they acquired in real life and have a lifelong learning
CST401.3	PO1	Students will be able to understand concept of searching in complex environment like searching in games
CST401.3	PO2	Students will be able to analyse game theory and Constraint satisfaction problem
CST401.3	PO3	Students will be able to design solutions for complex CSP problems
CST401.3	PO4	Students will be able to investigate into the different aspects of CSP problems and game theory

CST401.3	PO12	Students will be able to have a lifelong learning on the field of CSP and adversarial games
CST401.4	PO1	Students will be able to understand concept of Knowledge based agent
CST401.4	PO2	Students will be able to analyse the logic behind agents based on propositional logic
CST401.4	PO3	Students will be able to design solutions for First order logic problems and demonstrate unification, back propagation etc.
CST401.4	PO4	Students will be able to investigate into the different aspects of First Order Predicate Logic
CST401.4	PO12	Students will be able to have a lifelong learning on the field of Knowledge based agents
CST401.4	PO1	Students will be able to understand concept of Machine Learning
CST401.3	PO2	Students will be able to analyse learning problems and issues
CST401.3	PO5	Students will be able to use language like python to implement the basic algorithms

Department of Computer Science and Engineering

Programme: Bachelor of Technology Course Code: CSL411

Course Name: Compiler Lab Semester: 7

COURSE OUTCOMES

Course Outcomes: After the completion of the course the student will be able to

CO 1	Implement lexical analyzer using the tool LEX. **(Cognitive Knowledge Level: Apply)**
CO 2	Implement Syntax analyzer using the tool YACC. **(Cognitive Knowledge Level: Apply)**
CO 3	Design NFA and DFA for a problem and write programs to perform operations on it. **(Cognitive Knowledge Level: Apply)**
CO 4	Design and Implement Top-Down parsers. **(Cognitive Knowledge Level: Apply)**
CO 5	Design and Implement Bottom-Up parsers. **(Cognitive Knowledge Level: Apply)**
CO 6	Implement intermediate code for expressions. **(Cognitive Knowledge Level: Apply)**

CO - PO - PSO MAPPING

CO	Programme Outcomes(PO)												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSL411.CO1	3	3	2	2	1	-	-	2	-	2	-	2	-	-	-
CSL411.CO2	3	3	2	2	1	-	-	2	-	2	-	2	-	-	-
CSL411.CO3	3	3	2	2	-	-	-	2	-	2	-	2	-	-	-
CSL411.CO4	3	3	2	2	-	-	-	2	-	2	-	2	-	-	-
CSL411.CO5	3	3	2	2	-	-	-	2	-	2	-	2	-	-	-
CSL411.CO6	3	3	2	2	-	-	-	2	-	2	-	2	-	-	-
Average															

Correlation: 1-Low, 2-moderate, 3-high, No Correlation '-'

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JUSTIFICATION

SNO	PO/PSO MAPPED	JUSTIFICATION
CSL411.1	PO1	Usage of LEX tool helps to understand how to design the lexical analyzer
CSL411.1	PO2	Programming with LEX tool helps to understand how to design the lexical analyzer.
CSL411.1	PO3	The student are able to use LEX tool for developing lexical analyzer.
CSL411.1	PO4	Able to interpret the given problem and are able to use LEX tool for developing lexical analyzer
CSL411.1	PO5	Programming in LEX helps to understand basic principles of lexical analysis.
CSL411.1	PO8	The student is able to use LEX tool for developing lexical analyzer.
CSL411.1	PO10	The student is able to use LEX tool for developing lexical analyzer.
CSL411.1	PO12	Programming in LEX helps to understand basic principles of lexical analysis.
CSL411.2	PO1	Programming in LEX helps to understand basic principles of lexical analysis.
CSL411.2	PO2	They are able to use YACC tool for developing syntax analyzer.
CSL411.2	PO3	The student is able to apply the Usage of YACC tool that helps to understand how to design the syntax analyzer.

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CSL411.2	PO4	Programming in YACC helps to understand basic parsing principles.
CSL411.2	PO5	Knowledge of various intermediate representations helps to generate memory efficient code.
CSL411.2	PO8	Knowledge of various intermediate representations helps to generate efficient target code.
CSL411.2	PO10	Selection of suitable intermediate representation helps to reduce register usage.
CSL411.2	PO12	Understanding the basic steps of an assembler helps to design a 2 pass assembler.
CSL411.3	PO1	Knowledge about the structure of symbol table helps to develop efficient assemblers.
CSL411.3	PO2	Selection of suitable intermediate representation helps to reduce register usage.
CSL411.3	PO3	Understanding the basic steps of an assembler helps to design a 2 pass assembler.
CSL411.3	PO4	Knowledge about the structure of symbol table helps to develop efficient assemblers.
CSL411.3	PO8	Studies about various assemblers helps to distinguish its features and helps to design a two pass assembler
CSL411.3	PO10	Knowledge about the design of an assembler helps to understand the structure of symbol table.
CSL411.3	PO12	The student takes exposure to compiler writing tools.
CSL411.4	PO1	The student can implement and test simple optimization techniques.
CSL411.4	PO2	The student can implement the different phases of compiler.
CSL411.4	PO3	The students are able to generate intermediate code
CSL411.4	PO4	The student can grant permission to table or users by using primary and foreign key concepts

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CSL411.4	PO8	The student can implement Optimization techniques and generate machine level code.
CSL411.4	PO10	The student can apply the knowledge of Lex & Yacc tools to develop programs
CSL411.4	PO12	The student can grant permission to table or users by using primary and foreign key concepts
CSL411.5	PO1	The student can implement the different phases of compiler.
CSL411.5	PO2	The student can implement the different phases of compiler.
CSL411.5	PO3	The student takes exposure to compiler writing tools.
CSL411.5	PO4	The student can implement and test simple optimization techniques.
CSL411.5	PO8	Graduates will apply the knowledge of translators to analyze the new programming language constructs.
CSL411.5	PO10	Graduates will apply the learnt knowledge throughout their life for developing compilers for a new language.
CSL411.5	PO12	Graduates will develop robust application oriented software with ease.
CSL411.6	PO1	Graduates will apply the inner details of translators for better development and easier maintenance of the software product.
CSL411.6	PO2	Graduates will develop robust application oriented software with ease.
CSL411.6	PO3	Graduates will apply the learnt knowledge in research and development.
CSL411.6	PO4	Graduates will apply the knowledge of translators to analyze the new programming language constructs.
CSL411.6	PO8	Graduates will apply the learnt knowledge throughout their life for developing compilers for a new language.
CSL411.6	PO10	Graduates will develop robust application oriented software with ease.
CSL411.6	PO12	Graduates will apply the inner details of translators for better development and easier maintenance of the software product.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Programme: Bachelor of Technology

Course Code: CST 423

Course Name: Cloud Computing

Semester: 7

Course Outcome

CO	Description	Bloom's taxonomy level
CO1	Explain the various cloud computing models and services.	Understanding(U)
CO2	Demonstrate the significance of implementing virtualization techniques	Understanding(U)
CO3	Explain different cloud enabling technologies and compare private cloud platforms	Understanding(U)
CO4	Apply appropriate cloud programming methods to solve big data problems	Applying(P)
CO5	Describe the need for security mechanisms in cloud	Understanding(U)
CO6	Compare the different popular cloud computing platforms	Understanding(U)

CO - PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3												1	2	2
CO2	2	2	3												3
CO3	3												2		2
CO4	2	2	3	3	2								2	2	3
CO5	2	3												2	3
CO6	3														3

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Justifications for CO-PO-PSO Mapping

Mapping	LOW/ MEDIUM / HIGH	Justification
CST423.01 -PO1	**H**	Students will understand the limitations of the existing techniques and various cloud computing models and services
CST423.01 -PSO1	**L**	Students will be able to analyse, design and develop computing solutions to various cloud computing models and services
CST423.01 –PSO2	**M**	Students will be able to engage in independent and lifelong learning to various cloud computing models and services
CST423.01 –PSO3	**M**	Students will identify the work plan and methodology by demonstrating professionalism with ethics and applying the foundational concepts of computer science and Engineering to various cloud computing models and services
CST423.02 –PO1	**M**	The students are able to function effectively so as to demonstrate the significance of implementing virtualization techniques
CST423.02 –PO2	**M**	Students should prepare the working draft of the work plan and the proposed system architecture and to demonstrate the significance of implementing virtualization techniques
CST423.02 –PO3	**H**	Students are able to analyse the selected project, identify the project management aspects and propose a detailed financial plan to demonstrate the significance of implementing virtualization techniques
CST423.02 –PSO3	**H**	Students will identify the work plan and methodology by demonstrating professionalism with ethics and applying the foundational concepts of computer science and Engineering to demonstrate the significance of implementing virtualization techniques
CST423.03–PO1	**H**	Students will be able to plan and execute tasks utilizing available resources to identify different cloud enabling technologies and compare private cloud platforms
CST423.03–PSO1	**M**	Students will communicate effectively to identify different cloud enabling technologies and compare private cloud platforms

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CST423.03–PSO3	**M**	Students can use modern engineering tools and practice the lifelong learning to identify different cloud enabling technologies and compare private cloud platforms
CST423.04–PO1	**M**	The students are able to function effectively so as to apply appropriate cloud programming methods to solve big data problems
CST423.04–PO2	**M**	Students should prepare the working draft of the work plan and the proposed system architecture and to apply appropriate cloud programming methods to solve big data problems
CST423.04–PO3	**H**	Students may apply the principles of mathematics and science to identify and formulate the processes and prepare and present technical and scientific findings to apply appropriate cloud programming methods to solve big data problems
CST423.04–PO4	**H**	Students shall be able to conduct investigations on complex engineering problems to apply appropriate cloud programming methods to solve big data problems
CST423.04–PO5	**M**	With the knowledge about usage of modern tools, students are able to apply appropriate cloud programming methods to solve big data problems
CST423.04 -PSO1	**M**	Students will be able to analyse, design and develop computing solutions in a sustainable and socially relevant manner to apply appropriate cloud programming methods to solve big data problems
CST423.04 –PSO2	**M**	Students will be able to engage in independent and lifelong learning to apply appropriate cloud programming methods to solve big data problems
CST423.04 –PSO3	**M**	Students will apply the knowledge in mathematics, science and engineering to Identify technology/research gaps and propose innovative/creative solutions to apply appropriate cloud programming methods to solve big data problems
CST423.05–PO1	**M**	Students may provide innovative solutions to describe the need for security mechanisms in cloud
CST423.05–PO2	**H**	Students will apply software Engineering principles and practices, and prepare and present technical and scientific findings effectively to describe the need for security mechanisms in cloud
CST423.05 –PSO2	**M**	Students will be able to engage in independent and lifelong learning to describe the need for security mechanisms in cloud
CST423.05 –PSO3	**HH**	Students will apply the knowledge in mathematics, science and engineering to Identify technology/research gaps in security mechanisms in cloud and propose

		innovative/creative solutions and prepare and present technical and scientific findings effectively in written and oral forms
CST423.06–PO1	**H**	Students may provide innovative solutions to novel problems and prepare and present technical and scientific findings effectively in written and oral forms to compare the different popular cloud computing platforms
CST423.06 –PSO3	**H**	Students will apply the knowledge in mathematics, science and engineering to Identify technology/research gaps and propose innovative/creative solutions and prepare and present technical and scientific findings effectively in written and oral forms to compare the different popular cloud computing platforms

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Justifications for CO-PO-PSO Mapping

Mapping	LOW/ MEDIUM / HIGH	Justification
CSD415.01-PO1	**M**	Students will understand the limitations of the existing techniques and can use the engineering techniques to solve, real life engineering problems
CSD415.01-PO2	**M**	Students may analyse real life engineering problems and solve it using the Computer Science Engineering knowledge gained.
CSD415.01-PO3	**M**	Students will design and develop solutions for complex engineering problems by considering societal aspects like health, safety, legal and cultural in addition to functional aspects
CSD415.01-PO4	**L**	Students shall be able to conduct investigations on complex engineering problems by developing innovative components using IT methodologies.
CSD415.01-PO5	**M**	With the knowledge about usage of modern tools, students are able to model the engineering activities behind the proposed application.
CSD415.01-PO6	**M**	Students will also consider societal aspects like health, safety, legal, cultural and environmental contexts in addition to functional aspects while innovating and developing components, products and processes
CSD415.01-PO7	**M**	Students will propose real life engineering problems and solve it using the Computer Science Engineering knowledge by considering the societal and environmental contexts.
CSD415.01-PO8	**L**	Students may bring up workable design solutions and are able to apply ethical principles and commit to professional ethics during the preparation of the problem requirements
CSD415.01-PO9	**L**	Students shall also develop professional skills like research and entrepreneurship skills while working as a team to analyse problems and to arrive at workable design solutions.
CSD415.01-PO10	**L**	Students will communicate effectively on complex Engineering activities while working in groups and managing the development of components, and products.
CSD415.01-PO11	**L**	Students will develop project management skills and apply management principles /computer science & Engineering knowledge during the development of real-life Engineering solutions in multi-disciplinary environments.

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CSD415.01-PO12	**M**	Students will engage in independent and life-long learning in finding the solutions to engineering problems in the broadest context of advanced technology
CSD415.01-PSO1	**H**	Students will identify the area of interest and propose a real-world engineering problem by applying the foundational concepts of computer science and Engineering.
CSD415.01-PSO2	**H**	Students will design and develop quality software for scientific and business applications based on the proposed work plan and suggested methodologies.
CSD415.01-PSO3	**H**	Students will adapt emerging technologies to innovate the solutions to the real-world engineering problem and its suggested methodologies.
CSD415.02-PO1	**M**	Students will apply the knowledge in mathematics, science and engineering to develop products, processes or technologies for sustainable and socially relevant applications.
CSD415.02-PO2	**M**	Students will apply the principles of mathematics and science to develop products, processes or technologies for sustainable and socially relevant applications.
CSD415.02-PO3	**M**	Students will design and develop innovative solutions after identifying and analysing the specified needs with the consideration of public health, environmental problems etc.
CSD415.02-PO5	**L**	Students may innovate and develop products, processes or technologies for sustainable and socially relevant applications by using Modern engineering and IT tools.
CSD415.02-PO6	**H**	Students may practice professional engineering principles and apply reasoning analysis & design by considering societal aspects like health, safety, cultural and environmental contexts
CSD415.02-PO7	**H**	Students will demonstrate the engineering knowledge during the Analysis/Modelling/Simulation/Design and arriving at professional engineering solutions.
CSD415.02-PO8	**L**	Students will apply ethical principles during the development of products, processes or technologies for sustainable and socially relevant applications.
CSD415.02-PO9	**L**	Students will function effectively to develop products, processes or technologies for sustainable and socially relevant applications.

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CSD415.02-PO11	**L**	Students will design/ Model/Simulate and develop solutions for complex engineering problems by developing innovative components, products, processes and technology.
CSD415.02-PO12	**L**	Students will recognize the need of independent and life-long learning in finding the solutions to engineering problems in the broadest context of advanced technology
CSD415.02-PSO1	**H**	Students will be able to analyse, design and develop computing solutions by applying foundational concepts of Computer Science & Engineering.
CSD415.02-PSO2	**H**	Students will apply software Engineering principles and practices, working as a team to analyse problems and to develop quality software.
CSD415.02-PSO3	**H**	Students will adapt emerging technologies during the development of components, products and processes.
CSD415.03-PO9	**H**	The students are able to function effectively as an individual, or a team leader in diverse or multi-disciplinary settings during the identification of work plan and its methodology.
CSD415.03-PO10	**M**	Students should prepare the working draft of the Work plan and the proposed system architecture and will be able to communicate the complex engineering activities behind the project effectively.
CSD415.03-PO11	**M**	Students are able to analyse the selected project, identify the project management aspects and propose a detailed financial plan to develop multidisciplinary industrial solutions in societal context
CSD415.03-PO12	**L**	Students will be able to engage in independent and lifelong learning to achieve notable professional skills and come up with workable design solutions
CSD415.03-PSO1	**L**	Students will identify the work plan and methodology by demonstrating professionalism with ethics and applying the foundational concepts of computer science and Engineering.
CSD415.04-PO5	**M**	Students will be able to plan and execute tasks utilizing available resources within timelines, following ethical and professional norms.
CSD415.04-PO8	**H**	Students are able to apply ethical principles and commit to professional ethics during the design of components/ products/ processes of the proposed work.
CSD415.04-PO9	**M**	Understanding of engineering and social aspects help them to identify products which are essential to solve societal, health, safety, legal and cultural problems in diverse team or as an individual in multi-disciplinary settings

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CSD415.04-PO10	**M**	students will communicate effectively during the technical presentation and able to comprehend effectively give and receive clear demonstrations.
CSD415.04-PO11	**H**	Students are able to design components, products, or processes, utilising a systems-based approach by using modern computer aided tools and propose a detailed financial plan to derive the solutions.
CSD415.04-PO12	**M**	Students can use modern engineering tools and practice the life long learning to get design solutions for engineering problems.
CSD415.04-PSO1	**L**	Students may provide innovative solutions to novel problems with the knowledge of foundational engineering concepts.
CSD415.04-PSO2	**L**	Students will apply software Engineering principles and practices, working as a team to analyse problems and to develop quality software
CSD415.04-PSO3	**L**	Students may apply the principles of mathematics and science to identify and formulate the design components, products, or processes, utilising a systems approach by using modern computer aided tools
CSD415.05-PO1	**L**	Students will apply the knowledge in mathematics, science and engineering to Identify technology/research gaps and propose innovative/creative solutions
CSD415.05-PO2	**M**	Students will apply the principles of mathematics and science to Identify technology/research gaps and propose innovative/creative solutions
CSD415.05-PO3	**M**	Students will identify technology/research gaps and propose innovative/creative solutions for complex engineering problems by considering societal aspects like health, safety, legal and cultural in addition to functional aspects
CSD415.05-PO4	**L**	Students shall be able to conduct investigations for complex engineering problems to identify technology/research gaps and propose innovative/creative solutions
CSD415.05-PO5	**M**	With the knowledge about usage of modern tools, the students can propose innovative/creative solutions for complex engineering problems
CSD415.05-PO12	**L**	Students will be able to engage in independent and lifelong learning to achieve notable professional skills and come up with workable design solutions
CSD415.05-PSO1	**H**	Students will be able to identify technology/research gaps and propose innovative/creative solutions by applying foundational concepts of Computer Science & Engineering.
CSD415.05-PSO2	**H**	Students will apply software Engineering principles and practices to identify technology/research gaps and propose innovative/creative solutions

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CSD415.05-PSO3	**H**	Students will adapt emerging technologies during the development of components, products and processes for innovative/creative solutions
CSD415.06-PO5	**M**	With the knowledge of modern tools, students will be able to organize and communicate technical and scientific findings effectively in written and oral forms
CSD415.06-PO8	**M**	Students will be able to organize and communicate technical and scientific findings effectively in written and oral forms by applying ethical principles.
CSD415.06-PO9	**M**	Students will be able to organize and communicate technical and scientific findings effectively in written and oral forms by working as a team.
CSD415.06-PO10	**H**	Students will be able to organize and communicate technical and scientific findings effectively in written and oral forms
CSD415.06-PO11	**L**	Students will be able to manage, organize and communicate technical and scientific findings effectively in written and oral forms by considering the financial feasibility
CSD415.06-PO12	**L**	Students will be able to organize and communicate technical and scientific findings effectively in written and oral forms by which they can achieve life long learning

Course Outcome

CO	Description	Bloom's taxonomy level
CO1	Model and solve real world problems by applying knowledge across domains	Applying(P)
CO2	Develop products, processes or technologies for sustainable and socially relevant applications	Applying(P)
CO3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks	Applying(P)
CO4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms	Applying(P)
CO5	Identify technology/research gaps and propose innovative/creative solutions	Analyzing(A)
CO6	Organize and communicate technical and scientific findings effectively in written and oral forms	Applying(P)

CO - PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	2	2	1	1	1	1	2	3	3	3
CO2	2	2	2		1	3	3	1	1		1	1	3	3	3
CO3									3	2	2	1	1		
CO4					2			3	2	2	3	2	1	1	1
CO5	2	3	3	1	2							1	3	3	3
CO6					2			2	2	3	1	1			

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Programme: Bachelor of Technology
Course Name: Project Phase 1 and 2

Course Code: CSD415
Semester: 7 and 8

Course Outcome

CO	Description	Bloom's taxonomy level
CO1	Model and solve real world problems by applying knowledge across domains	Applying(P)
CO2	Develop products, processes or technologies for sustainable and socially relevant applications	Applying(P)
CO3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks	Applying(P)
CO4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms	Applying(P)
CO5	Identify technology/research gaps and propose innovative/creative solutions	Analyzing(A)
CO6	Organize and communicate technical and scientific findings effectively in written and oral forms	Applying(P)

CO - PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	2	2	1	1	1	1	2	3	3	3
CO2	2	2	2		1	3	3	1	1		1	1	3	3	3
CO3									3	2	2	1	1		
CO4					2			3	2	2	3	2	1	1	1
CO5	2	3	3	1	2							1	3	3	3
CO6					2			2	2	3	1	1			

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Justifications for CO-PO-PSO Mapping

Mapping	LOW/ MEDIUM / HIGH	Justification
CSD415.01-PO1	**M**	Students will understand the limitations of the existing techniques and can use the engineering techniques to solve, real life engineering problems
CSD415.01-PO2	**M**	Students may analyse real life engineering problems and solve it using the Computer Science Engineering knowledge gained.
CSD415.01-PO3	**M**	Students will design and develop solutions for complex engineering problems by considering societal aspects like health, safety, legal and cultural in addition to functional aspects
CSD415.01-PO4	**L**	Students shall be able to conduct investigations on complex engineering problems by developing innovative components using IT methodologies.
CSD415.01-PO5	**M**	With the knowledge about usage of modern tools, students are able to model the engineering activities behind the proposed application.
CSD415.01-PO6	**M**	Students will also consider societal aspects like health, safety, legal, cultural and environmental contexts in addition to functional aspects while innovating and developing components, products and processes
CSD415.01-PO7	**M**	Students will propose real life engineering problems and solve it using the Computer Science Engineering knowledge by considering the societal and environmental contexts.
CSD415.01-PO8	**L**	Students may bring up workable design solutions and are able to apply ethical principles and commit to professional ethics during the preparation of the problem requirements
CSD415.01-PO9	**L**	Students shall also develop professional skills like research and entrepreneurship skills while working as a team to analyse problems and to arrive at workable design solutions.
CSD415.01-PO10	**L**	Students will communicate effectively on complex Engineering activities while working in groups and managing the development of components, and products.
CSD415.01-PO11	**L**	Students will develop project management skills and apply management principles /computer science & Engineering knowledge during the development of real-life Engineering solutions in multi-disciplinary environments.

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CSD415.01-PO12	**M**	Students will engage in independent and life-long learning in finding the solutions to engineering problems in the broadest context of advanced technology
CSD415.01-PSO1	**H**	Students will identify the area of interest and propose a real-world engineering problem by applying the foundational concepts of computer science and Engineering.
CSD415.01-PSO2	**H**	Students will design and develop quality software for scientific and business applications based on the proposed work plan and suggested methodologies.
CSD415.01-PSO3	**H**	Students will adapt emerging technologies to innovate the solutions to the real-world engineering problem and its suggested methodologies.
CSD415.02-PO1	**M**	Students will apply the knowledge in mathematics, science and engineering to develop products, processes or technologies for sustainable and socially relevant applications.
CSD415.02-PO2	**M**	Students will apply the principles of mathematics and science to develop products, processes or technologies for sustainable and socially relevant applications.
CSD415.02-PO3	**M**	Students will design and develop innovative solutions after identifying and analysing the specified needs with the consideration of public health, environmental problems etc.
CSD415.02-PO5	**L**	Students may innovate and develop products, processes or technologies for sustainable and socially relevant applications by using Modern engineering and IT tools.
CSD415.02-PO6	**H**	Students may practice professional engineering principles and apply reasoning analysis & design by considering societal aspects like health, safety, cultural and environmental contexts
CSD415.02-PO7	**H**	Students will demonstrate the engineering knowledge during the Analysis/Modelling/Simulation/Design and arriving at professional engineering solutions.
CSD415.02-PO8	**L**	Students will apply ethical principles during the development of products, processes or technologies for sustainable and socially relevant applications.
CSD415.02-PO9	**L**	Students will function effectively to develop products, processes or technologies for sustainable and socially relevant applications.

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CSD415.02-PO11	**L**	Students will design/ Model/Simulate and develop solutions for complex engineering problems by developing innovative components, products, processes and technology.
CSD415.02-PO12	**L**	Students will recognize the need of independent and life-long learning in finding the solutions to engineering problems in the broadest context of advanced technology
CSD415.02-PSO1	**H**	Students will be able to analyse, design and develop computing solutions by applying foundational concepts of Computer Science & Engineering.
CSD415.02-PSO2	**H**	Students will apply software Engineering principles and practices, working as a team to analyse problems and to develop quality software.
CSD415.02-PSO3	**H**	Students will adapt emerging technologies during the development of components, products and processes.
CSD415.03-PO9	**H**	The students are able to function effectively as an individual, or a team leader in diverse or multi-disciplinary settings during the identification of work plan and its methodology.
CSD415.03-PO10	**M**	Students should prepare the working draft of the Work plan and the proposed system architecture and will be able to communicate the complex engineering activities behind the project effectively.
CSD415.03-PO11	**M**	Students are able to analyse the selected project, identify the project management aspects and propose a detailed financial plan to develop multidisciplinary industrial solutions in societal context
CSD415.03-PO12	**L**	Students will be able to engage in independent and lifelong learning to achieve notable professional skills and come up with workable design solutions
CSD415.03-PSO1	**L**	Students will identify the work plan and methodology by demonstrating professionalism with ethics and applying the foundational concepts of computer science and Engineering.
CSD415.04-PO5	**M**	Students will be able to plan and execute tasks utilizing available resources within timelines, following ethical and professional norms.
CSD415.04-PO8	**H**	Students are able to apply ethical principles and commit to professional ethics during the design of components/ products/ processes of the proposed work.
CSD415.04-PO9	**M**	Understanding of engineering and social aspects help them to identify products which are essential to solve societal, health, safety, legal and cultural problems in diverse team or as an individual in multi-disciplinary settings

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CSD415.04-PO10	**M**	students will communicate effectively during the technical presentation and able to comprehend effectively give and receive clear demonstrations.
CSD415.04-PO11	**H**	Students are able to design components, products, or processes, utilising a systems-based approach by using modern computer aided tools and propose a detailed financial plan to derive the solutions.
CSD415.04-PO12	**M**	Students can use modern engineering tools and practice the life long learning to get design solutions for engineering problems.
CSD415.04-PSO1	**L**	Students may provide innovative solutions to novel problems with the knowledge of foundational engineering concepts.
CSD415.04-PSO2	**L**	Students will apply software Engineering principles and practices, working as a team to analyse problems and to develop quality software
CSD415.04-PSO3	**L**	Students may apply the principles of mathematics and science to identify and formulate the design components, products, or processes, utilising a systems approach by using modern computer aided tools
CSD415.05-PO1	**L**	Students will apply the knowledge in mathematics, science and engineering to Identify technology/research gaps and propose innovative/creative solutions
CSD415.05-PO2	**M**	Students will apply the principles of mathematics and science to Identify technology/research gaps and propose innovative/creative solutions
CSD415.05-PO3	**M**	Students will identify technology/research gaps and propose innovative/creative solutions for complex engineering problems by considering societal aspects like health, safety, legal and cultural in addition to functional aspects
CSD415.05-PO4	**L**	Students shall be able to conduct investigations for complex engineering problems to identify technology/research gaps and propose innovative/creative solutions
CSD415.05-PO5	**M**	With the knowledge about usage of modern tools, the students can propose innovative/creative solutions for complex engineering problems
CSD415.05-PO12	**L**	Students will be able to engage in independent and lifelong learning to achieve notable professional skills and come up with workable design solutions
CSD415.05-PSO1	**H**	Students will be able to identify technology/research gaps and propose innovative/creative solutions by applying foundational concepts of Computer Science & Engineering.
CSD415.05-PSO2	**H**	Students will apply software Engineering principles and practices to identify technology/research gaps and propose innovative/creative solutions

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CSD415.05-PSO3	**H**	Students will adapt emerging technologies during the development of components, products and processes for innovative/creative solutions
CSD415.06-PO5	**M**	With the knowledge of modern tools, students will be able to organize and communicate technical and scientific findings effectively in written and oral forms
CSD415.06-PO8	**M**	Students will be able to organize and communicate technical and scientific findings effectively in written and oral forms by applying ethical principles.
CSD415.06-PO9	**M**	Students will be able to organize and communicate technical and scientific findings effectively in written and oral forms by working as a team.
CSD415.06-PO10	**H**	Students will be able to organize and communicate technical and scientific findings effectively in written and oral forms
CSD415.06-PO11	**L**	Students will be able to manage, organize and communicate technical and scientific findings effectively in written and oral forms by considering the financial feasibility
CSD415.06-PO12	**L**	Students will be able to organize and communicate technical and scientific findings effectively in written and oral forms by which they can achieve life long learning

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Course Outcomes

Course	: B.Tech	Course Code	: CST463
Course Name	: Web Programming	Year & Semester	: IV, S7

Academic Year: 2022-2023

Course Outcomes: After the completion of the course the student will be able to

CST463.CO1	Use HyperText Markup Language (HTML) for authoring web pages and understandthe fundamentals of WWW. **(Cognitive Knowledge Level: Understand)**
CST463.CO2	Construct and visually format responsive, interactive web pages using CSS and JavaScript (JS) **(Cognitive Knowledge Level: Apply)**
CST463.CO3	Construct websites using advanced sever side programming tool PHP **(Cognitive Knowledge Level: Apply)**
CST463.CO4	Develop dynamic web applications using PHP and perform MySQL database operations. **(Cognitive Knowledge Level: Apply)**
CST463.CO5	Explain the importance of object exchange formats using JSON and the MVC based web application development frameworks (Laravel) **(Cognitive Knowledge Level: Understand)**

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CO-PO-PSO MAPPING

Course : B.Tech
Course Code : CST463
Course Name : Web Programming
Year & Semester : IV, S7

Academic Year: 2022-2023

CO	PO												PSO		
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CST463.CO1	2	-	-	-	1	-	-	-	-	-	-	3	3	2	2
CST463.CO2	2	2	1	-	2	-	-	-	-	-	-	3	3	2	2
CST463.CO3	3	2	3	2	2	-	-	-	-	-	-	3	3	2	2
CST463.CO4	3	3	3	2	2	-	-	-	-	-	-	3	3	2	2
CST463.CO5	3	2	-	-	3	-	-	-	-	-	-	3	2	2	2
Average	3	2	2	2	2	-	-	-	-	-	-	3	3	2	2

Correlation	Value
LOW	1
MODERATE	2
HIGH/SUBSTANTIAL	3
NO CORRELATION	-

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CO-PO-PSO JUSTIFICATIONS

Course : B.Tech Course Code : CST463

Course Name : Web Programming Year & Semester : IV, S7

Academic Year: 2022-2023

Mapping	Low/Medium/ High	Justification
CST463.CO1-PO1	M	By understanding different components in web technology, HTML5 students are able to apply the knowledge for designing websites.
CST463.CO1-PO5	L	By understanding HTML5 and the basics of www, students are able to contribute to WWW using modern tools.
CST463.CO1-PO12	H	With the knowledge of different components in WWW and HTML , the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CST463.CO1-PSO1	H	Students will be able to analyse, design and develop computing solutions with the knowledge of WWW and HTML5.
CST463.CO1-PSO2	M	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge of different components in web technology ,WWW and HTML5
CST463.CO1-PSO3	M	Students will be able to adapt to emerging information and communication technologies by providing innovative solutions to novel problems with the knowledge gained from the understanding of different components in web technology, WWW and HTML5
CST463.CO2-PO1	M	With the knowledge about usage of HTML,CSS and Java script to design/ sketch interactive web pages, students are able to conduct design of experiments.
CST463.CO2-PO2	M	With the knowledge about usage of HTML,CSS and Java script, students are able to conduct analysis on the design of Web pages.
CST463.CO2-PO3	L	By understanding different CSS components in HTML, the students are able to providing user interactive designs for web sites.
CST463.CO2-PO5	M	With the knowledge about usage of HTML,CSS and Java script to design/ sketch interactive web pages, students are able to apply the knowledge for the design solutions for Web resources using modern tools
CST463.CO2-PO12	H	With the knowledge about usage of HTML,CSS and Java script to design/ sketch interactive web pages, the students are able to recognize the

		need for and to engage in independent and life-long learning in the broadest context of technological change
CST463.CO2-PSO1	H	Students will be able to analyse, design and develop computing solutions with the knowledge about usage of HTML,CSS and Java script to design/ sketch interactive web pages.
CST463.CO2-PO12	M	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge about usage of HTML,CSS and Java script to design/ sketch interactive web pages.
CST463.CO2-PO12	M	Students will be able to adapt to emerging information and communication technologies by providing innovative solutions to novel problems with the knowledge about usage of HTML/ XHTML to design/ sketch interactive web pages.
CST463.CO3-PO1	H	With the knowledge about usage of PHP to prepare a dynamic web document, students are able to apply the knowledge for the solution of engineering problems.
CST463.CO3-PO2	M	With the knowledge about usage of PHP to prepare a professional web document, students are able to analyse the engineering problems.
CST463.CO3-PO3	H	With the knowledge about usage of PHP to prepare a professional web document, students are able to design system components.
CST463.CO3-PO4	M	With the knowledge about usage of PHP to prepare a dynamicweb document, students are able to conduct design of experiments, analysis and interpretation of data to provide valid conclusions.
CST463.CO3-PO5	M	With the knowledge about usage of PHP to prepare a dynamic web document, students are able to use modern tools like CodeIgniter , WordPress to engineering activities with an understanding of the limitations.
CST463.CO3-PO12	H	With the knowledge about usage of PHP to prepare a dynamic web document, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CST463.CO3-PSO1	H	Students will be able to analyse, design and develop computing solutions with the knowledge about usage of PHP to prepare a deynamic web document.
CST463.CO3-PSO2	M	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge about usage of PHP to prepare a dynamic web sites
CST463.CO3-PSO3	M	Students will be able to adapt to emerging information and communication technologies by providing innovative solutions to novel problems with the knowledge about usage of PHP to prepare a dynamic web document.

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CST463.CO4-PO1	H	With the knowledge about usage of PHP and MYSQL to develop dynamic websites for user interactions, students are able to apply the knowledge for the solution of engineering problems.
CST463.CO4-PO2	H	With the knowledge about usage of PHP and MYSQL to develop dynamic website for user interactions, students are able to analyse the engineering problems.
CST463.CO4-PO3	H	With the knowledge about usage of PHP and MYSQL to develop dynamic website for user interactions, students are able to design system components.
CST463.CO4-PO4	M	With the knowledge about usage of PHP and MYSQL to develop dynamic websites for user interactions, students are able to conduct design of experiments, analysis and interpretation of data to provide valid conclusions.
CST463.CO4-PO5	M	With the knowledge about usage of PHP and MYSQL to develop dynamic website for user interactions, students are able to use modern tools to engineering activities with an understanding of the limitations.
CST463.CO4-PO12	H	With the knowledge about usage of PHP and MYSQL to develop dynamic website, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CST463.CO4-PSO1	H	Students will be able to analyse, design and develop computing solutions with the knowledge about usage of PHP and MYSQL to develop dynamic websites for user interactions.
CST463.CO4-PSO2	M	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge about usage of PHP and MYSQL to develop dynamic website
CST463.CO4-PSO3	M	Students will be able to adapt to emerging information and communication technologies by providing innovative solutions to novel problems with the knowledge about usage of PHP and MYSQL to develop dynamic website
CST463.CO5-PO1	H	With the knowledge about JSON and Laravel Framework, students are able to apply the knowledge for the solution of engineering problems.
CST463.CO5-PO2	M	With the knowledge about JSON and Laravel Framework, students are able to analyse the engineering problems.
CST463.CO5-PO5	M	With the knowledge about different information interchange formats like JSON and Laravel Framework, students are able to use modern tools to engineering activities with an understanding of the limitations.
CST463.CO5-PO12	H	With the knowledge about different information interchange formats like JSON and Laravel Framework, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CST463.CO5-PSO1	H	Students will be able to analyse, design and develop computing solutions with the knowledge about different information interchange formats like JSON and LARAVEL
CST463.CO5-PSO2	M	Students will be able to apply software engineering principles and practices for developing quality software with the gained knowledge about different information interchange formats like JSON & Laravel
CST463.CO5-PSO3	M	Students will be able to adapt to emerging information and communication technologies by providing innovative solutions to novel problems with the knowledge about different information interchange formats like JSON and Laravel.

SEMESTER 8

Department of Computer Science and Engineering

Programme : Bachelor of Technology
Course Code: CST 468
Course Name: BIOINFORMATICS
Semester: 8

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CST 468.CO1	Describe the basic concepts of Bioinformatics with an emphasis on structure, function and synthesis of biomolecules	K1
CST 468.CO2	Identify biological data formats and databases, retrieve bio-sequences, and align bio sequences to identify similarity	K3
CST 468.CO3	Employ similarity searching tools and algorithms to align sequences to highlight the similarity, and describe the structure of genes	K3
CST 468.CO4	Demonstrate Protein Structure, visualize protein structure using tools, and explain how proteins interact	K3
CST 468.CO5	Explain the fundamental aspects of Systems Biology, Computational Modeling and properties of models	K1

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	-	2	-	-	-
CO2	2	2	2	2	1	-	-	-	-	-	-	2	-	-	-
CO3	2	2	2	1	1	-	-	-	-	-	-	2	-	-	-
CO4	2	2	2	1	-	-	-	-	-	-	-	2	-	-	-
CO5	2	2	-	-	1	-	-	-	-	-	-	1	-	-	-
AVG	2	2	2	1	1	-	-	-	-	-	-	2	-	-	-

Correlation : 1-Low, 2-moderate, 3-high, No Correlation '-'

Department of Computer Science and Engineering

JUSTIFICATION

MAPPING	LOW/MEDIUM /HIGH	JUSTIFICATION
CST 468.CO1-PO1	M	By gaining the ability to identify bioinformatics concepts, the students will be able to analyze complex problems related to biology and information technology and also they will be able to apply the knowledge of mathematics, science, engineering fundamentals, to identify biological sequences.
CST 468.CO1-PO2	M	By gaining the ability to identify bioinformatics concepts, the students will be able to analyze complex problems related to biology and information technology by using first principles of mathematics, natural science and engineering science.
CST 468.CO1-PO12	M	By gaining the ability to identify bioinformatics concepts, the students will help the students in engaging in independent and life-long learning and analyzing
CST 468.CO2-PO1	M	By identifying biological data formats and databases, retrieve bio-sequences, and align bio sequences to identify similarity students will be able to apply the knowledge of science, engineering fundamentals and an engineering specialization to solve complex problems related to biology
CST 468.CO2-PO2	M	Students will be able to identify biological data formats and databases, retrieve bio-sequences, and align bio sequences to identify similarity.
CST 468.CO2-PO3	M	By identifying biological data formats and databases, retrieve bio-sequences, and align bio sequences to identify similarity students will be able to synthesis information and can provide valid conclusions
CST 468.CO2-PO4	M	By illustrating various biological databases and its import identifying biological data formats and databases, retrieve bio-sequences, and align bio sequences to identify similarity students will be able to design solutions for problems consideration for public health and safety
CST 468.CO2-PO5	L	identifying biological data formats and databases, retrieve bio-sequences, and align bio sequences to identify similarity

		students will be able to 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.
CST 468.CO2-PO12	M	identifying biological data formats and databases, retrieve bio-sequences, and align bio sequences to identify similarity will help the students in engaging in independent and life-long learning of bioinformatics
CST 468.CO3-PO1	M	By analyzing similarity searching tools and algorithms to align sequences to highlight the similarity, and describe the structure of genes the students will be able to apply the knowledge of science, engineering fundamentals and an engineering specialization to solve complex problems related to biology and genes.
CST 468.CO3-PO2	M	By understanding similarity searching tools and algorithms to align sequences to highlight the similarity, and describe the structure of genes will be able to identify Protein Structure, visualize protein structure using tools, and how proteins interact
CST 468.CO3-PO3	M	By designing Employ similarity searching tools and algorithms to align sequences to highlight the similarity, and describe the structure of genes the students will be able to identify and analyze sequence alignment, multiple sequences and scoring matrices
CST 468.CO3-PO4	L	By analyzing Employ similarity searching tools and algorithms to align sequences to highlight the similarity, and describe the structure of genes student will be able to design solutions for problems consideration for public health and safety
CST 468.CO3-PO5	L	By analyzing Employ similarity searching tools and algorithms to align sequences to highlight the similarity, and describe the structure of genes students will be able to 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.

CST 468.CO3-PO12	M	Employ similarity searching tools and algorithms to align sequences to highlight the similarity, and describe the structure of genes will help the students in engaging in independent and life-long learning and analyzing
CST 468.CO4-PO1	M	By gaining the ability to understand to Demonstrate Protein Structure, visualize protein structure using tools, and explain how proteins interact, the students will be able to apply the knowledge of science, engineering fundamentals and an engineering specialization to solve complex problems related and algorithms to biology.
CST 468.CO4-PO2	M	By understanding and applying various algorithms in bioinformatics students will be able to identify, formulate and analyze complex problems related to biology
CST 468.CO4-PO3	M	By understanding and applying various algorithms in bioinformatics students will be able to design solutions for complex biological problems and can design system components or processes that meet the specified needs for public health and safety.
CST 468.CO4-PO4	L	By understanding and applying various algorithms in bioinformatics students will be able to 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.
CST 468.CO4-PO12	M	Understanding and applying various algorithms will help the students in engaging in independent and life-long learning of bioinformatics
CST 468.CO5-PO1	M	By analyzing aspects of Systems Biology, Computational Modeling and properties of models, the students will be able to interpret various gene prediction approaches while applying the knowledge of science, engineering fundamentals and an engineering specialization to the solution
CST 468.CO5-PO2	M	Interpreting various aspects of Systems Biology, Computational Modeling and properties of models will help students to identify, formulate and analyze complex problems related to biology

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CST 468.CO5-PO5	L	By analyzing aspects of Systems Biology, Computational Modeling and properties of models students will be able to 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
CST 468.CO5-PO12	L	Students get the ability to engage in independent and lifelong learning to the aspects of Systems Biology, Computational Modeling and properties of models.

Prepared by

Angitha George

Course handling Faculty & Course Coordinator

Verified by

SARJU S

PAC Member

Approved by

Signature of HOD

Programme : Bachelor of Technology
Course Name: CLIENT SERVER ARCHITECTURE

__Course Code: CST 426
Semester: 6

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
CST426.1	Explain the basics of client/server systems and the driving force behind the development of client/server systems	K2
CST426.2	Outline the architecture and classifications of client/server systems	K2
CST426.3	Choose the appropriate client/server network services for a typical application	K2
CST426.4	Describe management services and issues in network	K2
CST426.5	Compare and summarize the web extensions and choose appropriate web services standards for an application	K2

CO - PO - PSO MAPPING

PO	Programme outcomes												PSO		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PO10	PO11	PO12	PS O1	PSO2	PSO 3
6.1	2	1	-	-	-	-	-	-	-	-	-	3	-	-	-
6.2	3	1	-	-	-	-	-	-	-	-	-	3	-	-	-
5.3	3	1	-	-	1	-	-	-	-	-	-	3	-	-	-
5.4	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-
5.5	3	1	2	-	-	-	-	-	-	-	-	2	-	-	-
	3	1	2	-	2	-	-	-	-	-	-	3	-	-	-

Correlation : 1-Low, 2-moderate, 3-high, No Correlation '-'

JUSTIFICATION

CO-PO	LEVEL (Low/Moderate/High)	JUSTIFICATION
CST426.1-PO1	M	With the knowledge in basics of client server systems, the students will be able to develop engineering knowledge
CST426.1-PO2	L	With the_knowledge in basics of client server systems and the driving force behind its development,the student will be able to do problem analysis
CST426.1-PO12	H	With the knowledge in basics of client server systems, the student will be able to develop solutions of different problems in the life long
CST426.2-PO1	H	With the knowledge in outlining the architecture the and classifications of client/server systems, the student will be able to gain engineering knowledge
CST426.2-PO2	L	With the knowledge in outlining the architecture the and classifications of client/server systems,the student will be able to do problem anlaysis
CST426.2-PO12	H	With the knowledge in outlining the architecture the and classifications of client/server systems, the student will be able to solve different problems in the life long
CST426.3-PO1	H	With the knowledge in summarizing the client/server network services for an application ,the student will be able to gain engineering knowledge
CST426.3-PO2	L	With the knowledge in summarizing the client/server network services for an application, the student will be able to do problem analysis
CST426.3-PO5	L	With the knowledge in summarizing the client/server network services for an application, the student will be able to use modern tools
CST426.3-PO12	H	With the knowledge in summarizing the client/server network services for an application, the student will be able to solve different problems in the life long

CST426.4-PO1	H	With the knowledge in_the management services and issues in network, the student will be able to gain engineering knowledge
CST426.4-PO12	H	With the knowledge in the management services and issues, the student will be able to solve different problems in the life long
CST426.5-PO1	H	With the knowledge in the web extensions and web services standards, the student will be able to get engineering knowledge
CST426.5-PO2	L	With the knowledge in the web extensions and web services standards, the student will be able to do problem analysis
CST426.5-PO3	M	With the knowledge in the web extensions and web services standards, the student will be able to develop solutions
CST426.5-PO12	M	With the knowledge in the web extensions and web services standards, the student will be able to solve different problems in the life long

Prepared by

Divya Sunny

Course handling Faculty

& Course Coordinator

Dr. Kishore Sebastian.

Verified by

PAC Member

Approved by

Signature of HOD

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course : B.Tech.

Course Code : CST402

Course Name : DISTRIBUTED COMPUTING

Semester : 8

COURSE OUTCOMES

Students will be able to:

CO	Statement	K LEVEL
CST402.CO1	Summarize various aspects of distributed computation model and logical time. (Cognitive Knowledge Level: Understand	K2
CST402.C02	Illustrate election algorithm, global snapshot algorithm and termination detection algorithm. (Cognitive Knowledge Level: Apply)	K3
CST402.C03	Compare token based, non-token based and quorum based mutual exclusion algorithms. (Cognitive Knowledge Level: Understand)	K2
CST402.C04	Recognize the significance of deadlock detection and shared memory in distributed systems. (Cognitive Knowledge Level: Understand	K2
CST402.C05	Explain the concepts of failure recovery and consensus. (Cognitive Knowledge Level: Understand)	K2
CST402.C06	Illustrate distributed file system architectures. (Cognitive Knowledge Level: Understand)	K2

Name & Signature of the Faculty Member

Jibin Philip

Kishore Sebastian.

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CO-PO-PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	1	-	1	-	2	-	1	-	3	3	-	-
2	3	1	2	1	-	1	-	2	2	1	-	3	2	-	2
3	3	1	2	1	2	1	-	2	1	1	-	3	2	1	2
	3	2	1	2	-	1	-	2	2	-	-	3	1	-	1
	3	2	2	2	-	1	-	2	-	-	-	3	2	-	2
	3	2	-	1	-	1	-	2	-	-	-	3	1	-	-
ge	3	2	2	1	2	1	-	2	-	1	-	3	2	1	2

Correlation High:3 Medium :2 Low:1 No correlation:-

Prepared by

Jibin Philip

Course handling Faculty & Course Coordinator

Verified by

PAC Member

Approved by

Signature of HOD

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course : B.Tech.
Course Name : DISTRIBUTED COMPUTING

Course Code : CST 402
Semester : 8

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Low/Medium/High	Justification
CST402.CO1-PO1	H	The subject contributes to the program outcome by providing opportunity to students to understand basic concepts in distributed computing to solve complex engineering problems.
CST402.CO1-PO2	M	The subject contributes to the program outcome by providing opportunity to students to compare distributed systems and other computer paradigms.
CST402.CO1-PO3	M	The subject contributes to the program outcome by providing opportunity to students to design solutions for complex engineering problems by distinguishing distributed systems from other paradigms.
CST402.CO1-PO4	L	The subject contributes to the program outcome by providing opportunity to students to use research-based knowledge and research methods in distributed systems.
CST402.CO1-PO6	L	The subject contributes to the program outcome by providing opportunity to students to apply reasoning informed by the contextual knowledge to assess safety and legal issues and the consequent responsibilities relevant to the professional engineering practice.
CST402.CO1-PO8	M	The subject contributes to the program outcome by providing opportunity to students to apply ethical principles in differentiating distributed computing from other paradigms.
CST402.CO1-PO10	L	The subject contributes to the program outcome by providing opportunity to communicate effectively on complex engineering activities with the engineering community by distinguishing distributed computing paradigm from other computing paradigms
CST402.CO1-PO12	H	The knowledge of computing paradigms helps to learn many other topic of engineering and help for a lifelong learning.

CST402.CO1-PSO1	H	The subject contributes to the program outcome by providing opportunity to students to analyse, design and develop computing solutions .
CST402.CO2-PO1	H	The subject contributes to the program outcome by providing engineering fundamentals to solve complex engineering problems
CST402.CO2-PO2	L	The subject contributes to the program outcome by providing knowledge about core concepts of distributed systems.
CST402.CO2-PO3	M	The subject contributes to the program outcome by providing opportunity to students to design solutions for engineering problems in view of public safety.
CST402.CO2-PO4	L	The subject contributes to the program outcome by providing opportunity to students to use research-based knowledge and research methods in distributed systems.
CST402.CO2-PO6	L	The subject contributes to the program outcome by providing opportunity to students to apply reasoning by understanding core concepts in distributed systems.
CST402.CO2-PO8	M	The subject contributes to the program outcome by providing opportunity to students to apply ethical principles by understanding core concepts in distributed systems.
CST402.CO2-PO9	M	The subject contributes to the program outcome by providing opportunity to students to function effectively as an individual in multidisciplinary settings.
CST402.CO2-PO10	L	The subject contributes to the program outcome by providing opportunity to communicate effectively on complex engineering activities with the engineering community by understanding core concepts in distributed systems.
CST402.CO2-PO12	H	The knowledge of distributed computing helps to learn many other topics of engineering and help for a lifelong learning.
CST402.CO2-PSO1	M	Students will be able to design and develop computing solutions using distributed system concepts.
CST402.CO2-PSO3	M	Students will be able to use core distributed techniques for providing innovative ideas to adapt new emerging information & communication technologies.
CST402.CO3-PO1	H	The subject contributes to the program outcome by providing interprocess communication fundamentals to solve complex engineering problems
CST402.CO3-PO2	L	The subject contributes to the program outcome by providing analysis of different interprocess communication mechanisms.
CST402.CO3-PO3	M	The subject contributes to the program outcome by providing secure mechanisms of interprocess communication.
CST402.CO3-PO4	L	The subject contributes to the program outcome by providing opportunity to students to use research-based knowledge and research methods in interprocess communication.

CST402.CO3-PO5	M	providing opportunity to students for examining the working of Skype.
CST402.CO3-PO6	L	The subject contributes to the program outcome by providing opportunity to students to apply reasoning by understanding core concepts in interprocess communication.
CST402.CO3-PO8	M	The subject contributes to the program outcome by providing opportunity to students to apply ethical principles by understanding interprocess communication.
CST402.CO3-PO9	L	The subject contributes to the program outcome by providing opportunity to students to function effectively as an individual in multidisciplinary settings.
CST402.CO3-PO10	L	The subject contributes to the program outcome by providing opportunity to communicate effectively using interprocess communication.
CST402.CO3-PO12	H	The knowledge of interprocess communication helps to learn many other topic of engineering and help for a lifelong learning.
CST402.CO3-PSO1	M	Students will be able to implement Remote Procedure Call mechanisms for Inter process communication.
CST402.CO3-PSO2	L	The subject contributes to the program outcome by providing opportunity to students to develop systems based on interprocess communication.
CST402.CO3-PSO3	M	Students will be able to identify and design computing solutions for interprocess communication in distributed systems.
CST402.CO4-PO1	H	The subject contributes to the program outcome by providing opportunity to students to study the fundamentals in Distributed File System
CST402.CO4-PO2	M	The subject contributes to the program outcome by providing mechanisms for ensuring transparency, consistency and fault-tolerance in distributed file system
CST402.CO4-PO3	L	The subject contributes to the program outcome by providing secure mechanisms distributed file storage and access.
CST402.CO4-PO4	M	The subject contributes to the program outcome by providing opportunity to students to use research-based knowledge and research methods in distributed file systems.
CST402.CO4-PO6	L	The subject contributes to the program outcome by providing opportunity to students to apply reasoning by understanding distributed file systems.
CST402.CO4-PO8	M	The subject contributes to the program outcome by providing opportunity to students to apply ethical principles by understanding distributed file systems.
CST402.CO4-PO9	M	The subject contributes to the program outcome by providing opportunity to students to function effectively as an individual in multidisciplinary settings.
CST402.CO4-PO12	H	The knowledge of distributed file system helps to learn many other topics of engineering and help for a lifelong learning.

CST402.CO4-PSO1	L	solutions by ensuring consistent and uniform naming of resources
CST402.CO4-PSO3	L	Students will be able to use modern file system architectures.
CST402.CO5-PO1	H	Knowledge in differentiating different concurrency control mechanisms to choose the best methods for a particular application.
CST402.CO5-PO2	M	The subject contributes to the program outcome by providing secure methods of transaction handling.
CST402.CO5-PO3	M	Students will be able to design computing solutions by providing secure and consistent transactional environment.
CST402.CO5-PO4	M	The subject contributes to the program outcome by providing opportunity to students to use research-based knowledge and research methods in concurrency control mechanisms in distributed transactional transactional environment.
CST402.CO5-PO6	L	The subject contributes to the program outcome by providing opportunity to students to apply reasoning by choosing right concurrency control mechanisms.
CST402.CO5-PO8	M	The subject contributes to the program outcome by providing opportunity to students to apply ethical principles to work in a distributed transactional environment.
CST402.CO5-PO12	H	The knowledge of distributed systems transaction processing helps to learn many other topic of engineering and help for a lifelong learning.
CST402.CO5-PSO1	M	Students will be able to identify and design computing solutions by comparing the concurrency control mechanisms in distributed environment.
CST402.CO5-PSO3	M	Students will be able to provide computing solutions with advanced transaction processing capability.
CST402.CO6-PO1	M	The subject contributes to the program outcome by providing basic features of mutual exclusion.
CST402.CO6-PO2	M	The subject contributes to the program outcome by providing opportunity to students to identify the needs for mutual exclusion and election algorithms in implementing distributed systems.
CST402.CO6-PO4	L	The subject contributes to the program outcome by providing opportunity to students to use research-based knowledge and research methods in concurrency control mechanisms in mutual exclusion and election algorithms in distributed systems.
CST402.CO6-PO6	L	The subject contributes to the program outcome by providing opportunity to students to apply reasoning by choosing efficient mutual exclusion and election algorithm in distributed environment
CST402.CO6-PO8	M	The subject contributes to the program outcome by providing opportunity to students to apply ethical principles by understanding mutual exclusion and election algorithms.
CST402.CO6-PO12	H	The knowledge of mutual exclusion in distributed systems helps to learn many other topics of engineering and help for a lifelong learning.

CST402.CO6-PSO1	L	solutions that incorporate mutual exclusion in distributed systems.

Name & Signature of the Faculty Member

Kishore Sebastian.

Jibin Philip

Course Outcome

CO	Description	Bloom's taxonomy level
CO1	Outline the fundamentals of IoT and its underlying physical and logical architecture	Understanding(U)
CO2	Explain the hardware architectures for IoT	Understanding(U)
CO3	Outline the Network architectures for IoT	Understanding(U)
CO4	Implement data analytics on the IoT platforms	Applying(P)
CO5	Appreciate the security considerations in IoT	Understanding(U)
CO6	Implement IoT applications using the available hardware and software.	Applying(P)

CO - PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3									2	1		2
CO2	2	3	3									3		2	3
CO3	3	3	2									2	2	2	2
CO4	2	2	3	3	2							3		3	
CO5	2	2	2		3							3	2	3	2
CO6	3	2	2	3	3	2						2	2		3

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Justifications for CO-PO-PSO Mapping

Mapping	LOW/ MEDIUM / HIGH	Justification
CST448 .01 -PO1	M	Students will attain the knowledge of fundamentals of IoT and its underlying physical and logical architecture to the solution of complex engineering problems.
CST448 .01 –PO2	M	Students may analyse complex engineering problems reaching substantiated conclusions using principles of fundamentals of IoT and its underlying physical and logical architecture
CST448 .01 –PO3	H	Students may design solutions for complex engineering problems and design system components or processes based on fundamentals of IoT and its underlying physical and logical architecture.
CST448 .01 – PO12	M	Students will recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of IoT and its underlying physical and logical architecture.
CST448 .01 -PSO1	L	Students will be able to analyse, design and develop computing solutions by applying foundational concepts of IoT and its underlying physical and logical architecture.
CST448 .01 –PSO3	M	Students will adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions based on IoT and its underlying physical and logical architecture.
CST448 .02 –PO1	M	Students will attain the knowledge of hardware architectures for IoT to the solution of complex engineering problems.
CST448 .02 –PO2	H	Students may analyse complex engineering problems reaching substantiated conclusions using principles of fundamentals of hardware architectures for IoT
CST448 .02 –PO3	H	Students may design solutions for complex engineering problems and design system components or processes based on fundamentals of hardware architectures for IoT
CST448 .02 – PO12	H	Students will recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of hardware architectures for IoT

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CST448 .02 –PSO2	M	Students will apply software engineering principles and practices for developing quality software for scientific and business applications based on hardware architectures for IoT.
CST448 .02–PSO3	H	Students will adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions based on hardware architectures for IoT
CST448 .03–PO1	H	Students will attain the knowledge of fundamentals of Network architectures for IoT to the solution of complex engineering problems.
CST448 .03 –PO2	H	Students may analyse complex engineering problems reaching substantiated conclusions using principles of fundamentals of Network architectures for IoT
CST448 .03 –PO3	H	Students may design solutions for complex engineering problems and design system components or processes based on fundamentals of Network architectures for IoT
CST448 .03 – PO12	M	Students will recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of Network architectures for IoT
CST448 .03–PSO1	M	Students will be able to analyse, design and develop computing solutions by applying foundational concepts of Network architectures for IoT
CST448 .03–PSO2	M	Students will apply software engineering principles and practices for developing quality software by using Network architectures for IoT for scientific and business applications.
CST448 .03–PSO3	M	Students will adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions based on Network architectures for IoT
CST448 .04–PO1	M	Students will attain the knowledge of fundamentals of data analytics on the IoT platforms to the solution of complex engineering problems.
CST448 .04–PO2	M	Students may analyse complex engineering problems reaching substantiated conclusions using principles of fundamentals of data analytics on the IoT platforms
CST448 .04–PO3	H	Students may design solutions for complex engineering problems and design system components or processes based on fundamentals of data analytics on the IoT platforms
CST448 .04–PO4	H	Students will use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the

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		information to provide valid conclusions based on data analytics on the IoT platforms.
CST448 .04–PO5	M	Students will create, select, and apply data analytics on the IoT platforms techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
CST448 .04–PO12	H	Students will recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of data analytics on the IoT platforms
CST448 .04 –PSO2	H	Students will apply software engineering principles and practices for developing quality software for scientific and business applications based on data analytics on the IoT platforms.
CST448 .05–PO1	M	Students will attain the knowledge of fundamentals of security considerations in IoT to the solution of complex engineering problems.
CST448 .05–PO2	M	Students may analyse complex engineering problems reaching substantiated conclusions using principles of fundamentals of security considerations in IoT
CST448 .05–PO3	M	Students may design solutions for complex engineering problems and design system components or processes based on fundamentals of security considerations in IoT
CST448 .05–PO5	H	Students will 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 of security considerations in IoT.
CST448 .05–PO12	H	Students will recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of security considerations in IoT
CST448 .05 –PSO1	M	Students will be able to analyse, design and develop computing solutions by applying foundational concepts of security considerations in IoT
CST448 .05 –PSO2	H	Students will apply software engineering principles and practices for developing quality software for scientific and business applications by adopting security considerations in IoT.
CST448 .05 –PSO3	M	Students will adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions based on security considerations in IoT

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CST448 .06–PO1	H	Students will attain the knowledge of IoT applications using the available hardware and software.to the solution of complex engineering problems.
CST448 .06–PO2	M	Students may analyse complex engineering problems reaching substantiated conclusions using principles of IoT applications using the available hardware and software.
CST448 .06–PO3	M	Students may design solutions for complex engineering problems and design system components or processes based on IoT applications using the available hardware and software.
CST448 .06–PO4	H	Students will 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 based on IoT applications using the available hardware and software..
CST448 .06–PO5	H	Students will create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling IoT applications using the available hardware and software.
CST448 .06–PO6	M	Students will 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 on IoT applications using the available hardware and software..
CST448 .06–PO12	M	Students will recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of IoT applications using the available hardware and software.
CST448 .06 –PSO1	M	Students will be able to analyse, design and develop computing solutions by applying foundational concepts of IoT applications using the available hardware and software.
CST448 .06 –PSO3	H	Students will adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions based on IoT applications using the available hardware and software.

Name and Signature of the Faculty In-charge

Bibu Thomas

Dyni Thomas

PAC Member

Course Outcome

CO	Description	Bloom's taxonomy level
CO1	Explain the various mobile computing applications, services, design considerations and architectures	Understanding(U)
CO2	Describe the various technology trends for next generation cellular wireless networks and use the spreading concept on data transmission	Applying(P)
CO3	Summarize the architecture of various wireless LAN technologies	Understanding(U)
CO4	Identify the functionalities of mobile network layer and transport layer	Understanding(U)
CO5	Explain the features of Wireless Application Protocol	Understanding(U)
CO6	Interpret the security issues in mobile computing and next generation technologies	Understanding(U)

CO - PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3										1	2		
CO2	2	1	3	1								1	2		1
CO3	2	2	1	1								2	1		1
CO4	1	1	2									2	1		
CO5	2	1	2									2	1		1
CO6	2	2	3									3			1

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CST 476 .02–PSO3	L	Students can adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems based on next generation cellular wireless networks.
CST 476 .03–PO1	M	Students will be able to plan and execute tasks utilizing available resources to identify different architecture of various wireless LAN technologies
CST 476 .03 –PO2	M	Students should prepare the working draft of the work plan and the proposed system architecture and to demonstrate the significance of architecture of various wireless LAN technologies
CST 476 .03 –PO3	L	Students are able to design solutions for complex engineering problems and design system components or processes implementing using architecture of various wireless LAN technologies
CST 476 .03 –PO4	L	Students are able to gain research-based knowledge and research methods including design of to demonstrate the significance of architecture of various wireless LAN technologies
CST 476 .03 – PO12	M	Students are able to ability to engage in independent and life-long learning in the broadest context of architecture of various wireless LAN technologies
CST 476 .03–PSO1	L	Students can analyse, design and develop computing solutions by applying foundational concepts of wireless LAN technologies.
CST 476 .03–PSO3	L	Students can adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems by knowing architecture of various wireless LAN technologies
CST 476 .04–PO1	L	The students are able to apply knowledge so as to apply appropriate functionalities of mobile network layer and transport layer to the solution of complex engineering problems.
CST 476 .04–PO2	L	Students should identify, formulate, review research literature, and analyze complex engineering problems by using functionalities of mobile network layer and transport layer
CST 476 .04–PO3	M	Students can design solutions for complex engineering problems and design system components or processes knowledge on functionalities of mobile network layer and transport layer
CST 476 .04– PO12	L	Students shall be able to engage in independent and life-long learning in the broadest context of functionalities of mobile network layer and transport layer
CST 476 .04 - PSO1	L	Students can analyse, design and develop computing solutions by applying functionalities of mobile network layer and transport layer

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CST 476 .05–PO1	M	The students are able to apply knowledge so as to apply appropriate functionalities of Wireless Application Protocol
CST 476 .05–PO2	L	Students should identify, formulate, review research literature, and analyze complex engineering problems by using features of Wireless Application Protocol.
CST 476 .05–PO3	M	Students can design solutions for complex engineering problems and design system components or processes knowledge on features of Wireless Application Protocol.
CST 476 .05–PO12	M	Students shall be able to engage in independent and life-long learning in the broadest context of functionalities of Wireless Application Protocol.
CST 476 .05 – PSO1	L	Students can analyse, design and develop computing solutions by applying foundational concepts of Wireless Application Protocol.
CST 476 .05 – PSO3	L	Students can adapt to emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems by knowing features of Wireless Application Protocol.
CST 476 .06–PO1	H	The students are able to apply knowledge by interpret the security issues in mobile computing and next generation technologies
CST 476 .06–PO2	L	Students should identify, formulate, review research literature, and analyze complex engineering problems by using interpret the security issues in mobile computing and next generation technologies
CST 476 .06–PO3	M	Students can design solutions for complex engineering problems and design system components by interpret the security issues in mobile computing and next generation technologies
CST 476 .06–PO12	M	Students shall be able to engage in independent and life-long learning in the broadest context of security issues in mobile computing and next generation technologies
CST 476 .06 – PSO3	H	Students will apply the emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems based on security issues in mobile computing and next generation technologies.

MARIA YESUDAS Dona Mary Cherian

Name and Signature of the Faculty In-charge

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE OUTCOMES

Course	: B.Tech	Course Code	: CST 444
Course Name	: SOFT COMPUTING	Year & Semester	: Fourth, S8

Academic Year: 2022-2023

CO#	CO
CO1	Describe soft computing techniques in general and the basic models of Artificial Neural Network **(Cognitive Knowledge Level: Understand)**
CO2	Apply neural network to solve practical problems **(Cognitive Knowledge Level: Apply)**
CO3	Use the concepts of fuzzy logic in developing fuzzy system **(Cognitive Knowledge Level: Apply)**
CO4	Illustrate the steps in Genetic Algorithm & Fuzzy Inference System **(Cognitive Knowledge Level: Apply)**
CO5	Describe the concepts of multi-objective optimization models and the need for using hybrid soft computing approaches **(Cognitive Knowledge Level: Understand)**

Smitha Jacob

Name and Signature of the Faculty In-charge

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE OUTCOMES

Course : B.Tech
Course Code : CST 444
Course Name : SOFT COMPUTING
Year & Semester : Fourth, S8

Academic Year: 2022-2023

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	LOW/ MEDIUM/ HIGH	Justification
CST444.1-PO1	L	Students could understand the knowledge of softcomputing for solutions to engineering problems
CST444.1-PO2	L	Students could arrive at conclusions using principles of soft Computing
CST444.1.1-PO3	L	Students may design soft computing systems for societal needs
CST444.1.1-PO12	L	Students may learn and adapt new soft computing technologies in developing solutions
CST444.1-PSO1	L	They can design solutions for complex engineering problems by understanding the core principles of working of human brain.
CST444.1-PSO3	H	Students acquire competency in designing and developing soft computing algorithms which meets the demands of the industry.
CST444.2-P01	M	Students will be able to describe neural network architectures
CST444.2-PO2	M	Students will be able to analyses problems and arrive at conclusions using neural networks.
CST444.2-PO3	H	Students will be able to design systems using neural networks
CST444.2-PSO1	L	Understanding of the working of different neural architectures
CST444.2-PSO3	H	Students acquire competency in developing a neural network
CST444.3-PO1	M	Students will be able to describe various fuzzy systems
CST444.3-PO2	M	Students will be able to describe various fuzzy operations
CST444.3-PO3	H	Students gain competency in designing fuzzy inference system
CST444.3-PSO1	L	Understanding the working of various methods fuzzy systems
CST444.3-PSO3	H	Students acquire competency in developing good fuzzy inference system
CST444.4-PO1	L	Students will be able to identify different genetic algorithm operations
CST444.4-PO2	L	Students will gain knowledge in applying genetic algorithm methods

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CST444.4-PO3	M	Students gain competency in designing a genetic method for a problem
CST444.4-PSO1	L	Understanding of the design and working of genetic algorithm based method
CST444.5-PO1	M	Students will be able to identify different soft computing methods for real time problems and learn to choose hybrid models to solve the problems
CST444.5-PO2	M	Students will be able to design algorithms using standard practices of multi-objective optimization models(MOO) in soft computing
CST444.5-PO4	M	Students are able to analyse complex multi-objective optimization models(MOO) in softcomputing
CST444.5-PO5	L	Students learn the concepts of multi-objective optimization models uisnf modern tools and usage of hybrid models.
CST444.5-PO12	H	Identify and select a suitable Hybrid Soft Computing technology to solve the problem; construct a solution and implement a Soft Computing solution
CST444.5-PSO1	M	Students gain medium level competency in identifying and designing Hybrid Soft Computing technology
CST444.5-PSO2	H	Students gain competency in designing and developing their own softcomputing system
CST444.5-PSO3	M	Students acquire medium competency in design and development of soft computing system in the field of Pattern recognition , weather Prediction,pattern classification etc

COURSE COORDINATOR

STREAM CO-ORDINATOR

PAC Member

HOD

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Programme: Bachelor of Technology
Course Name: Project Phase 1 and 2

Course Code: CSD415
Semester: 7 and 8

Course Outcome

CO	Description	Bloom's taxonomy level
CO1	Model and solve real world problems by applying knowledge across domains	Applying(P)
CO2	Develop products, processes or technologies for sustainable and socially relevant applications	Applying(P)
CO3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks	Applying(P)
CO4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms	Applying(P)
CO5	Identify technology/research gaps and propose innovative/creative solutions	Analyzing(A)
CO6	Organize and communicate technical and scientific findings effectively in written and oral forms	Applying(P)

CO - PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	2	2	1	1	1	1	2	3	3	3
CO2	2	2	2		1	3	3	1	1		1	1	3	3	3
CO3									3	2	2	1	1		
CO4					2			3	2	2	3	2	1	1	1
CO5	2	3	3	1	2							1	3	3	3
CO6					2			2	2	3	1	1			

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Justifications for CO-PO-PSO Mapping

Mapping	LOW/ MEDIUM / HIGH	Justification
CSD415.01-PO1	**M**	Students will understand the limitations of the existing techniques and can use the engineering techniques to solve, real life engineering problems
CSD415.01-PO2	**M**	Students may analyse real life engineering problems and solve it using the Computer Science Engineering knowledge gained.
CSD415.01-PO3	**M**	Students will design and develop solutions for complex engineering problems by considering societal aspects like health, safety, legal and cultural in addition to functional aspects
CSD415.01-PO4	**L**	Students shall be able to conduct investigations on complex engineering problems by developing innovative components using IT methodologies.
CSD415.01-PO5	**M**	With the knowledge about usage of modern tools, students are able to model the engineering activities behind the proposed application.
CSD415.01-PO6	**M**	Students will also consider societal aspects like health, safety, legal, cultural and environmental contexts in addition to functional aspects while innovating and developing components, products and processes
CSD415.01-PO7	**M**	Students will propose real life engineering problems and solve it using the Computer Science Engineering knowledge by considering the societal and environmental contexts.
CSD415.01-PO8	**L**	Students may bring up workable design solutions and are able to apply ethical principles and commit to professional ethics during the preparation of the problem requirements
CSD415.01-PO9	**L**	Students shall also develop professional skills like research and entrepreneurship skills while working as a team to analyse problems and to arrive at workable design solutions.
CSD415.01-PO10	**L**	Students will communicate effectively on complex Engineering activities while working in groups and managing the development of components, and products.
CSD415.01-PO11	**L**	Students will develop project management skills and apply management principles /computer science & Engineering knowledge during the development of real-life Engineering solutions in multi-disciplinary environments.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CSD415.01-PO12	**M**	Students will engage in independent and life-long learning in finding the solutions to engineering problems in the broadest context of advanced technology
CSD415.01-PSO1	**H**	Students will identify the area of interest and propose a real-world engineering problem by applying the foundational concepts of computer science and Engineering.
CSD415.01-PSO2	**H**	Students will design and develop quality software for scientific and business applications based on the proposed work plan and suggested methodologies.
CSD415.01-PSO3	**H**	Students will adapt emerging technologies to innovate the solutions to the real-world engineering problem and its suggested methodologies.
CSD415.02-PO1	**M**	Students will apply the knowledge in mathematics, science and engineering to develop products, processes or technologies for sustainable and socially relevant applications.
CSD415.02-PO2	**M**	Students will apply the principles of mathematics and science to develop products, processes or technologies for sustainable and socially relevant applications.
CSD415.02-PO3	**M**	Students will design and develop innovative solutions after identifying and analysing the specified needs with the consideration of public health, environmental problems etc.
CSD415.02-PO5	**L**	Students may innovate and develop products, processes or technologies for sustainable and socially relevant applications by using Modern engineering and IT tools.
CSD415.02-PO6	**H**	Students may practice professional engineering principles and apply reasoning analysis & design by considering societal aspects like health, safety, cultural and environmental contexts
CSD415.02-PO7	**H**	Students will demonstrate the engineering knowledge during the Analysis/Modelling/Simulation/Design and arriving at professional engineering solutions.
CSD415.02-PO8	**L**	Students will apply ethical principles during the development of products, processes or technologies for sustainable and socially relevant applications.
CSD415.02-PO9	**L**	Students will function effectively to develop products, processes or technologies for sustainable and socially relevant applications.

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CSD415.02-PO11	**L**	Students will design/ Model/Simulate and develop solutions for complex engineering problems by developing innovative components, products, processes and technology.
CSD415.02-PO12	**L**	Students will recognize the need of independent and life-long learning in finding the solutions to engineering problems in the broadest context of advanced technology
CSD415.02-PSO1	**H**	Students will be able to analyse, design and develop computing solutions by applying foundational concepts of Computer Science & Engineering.
CSD415.02-PSO2	**H**	Students will apply software Engineering principles and practices, working as a team to analyse problems and to develop quality software.
CSD415.02-PSO3	**H**	Students will adapt emerging technologies during the development of components, products and processes.
CSD415.03-PO9	**H**	The students are able to function effectively as an individual, or a team leader in diverse or multi-disciplinary settings during the identification of work plan and its methodology.
CSD415.03-PO10	**M**	Students should prepare the working draft of the Work plan and the proposed system architecture and will be able to communicate the complex engineering activities behind the project effectively.
CSD415.03-PO11	**M**	Students are able to analyse the selected project, identify the project management aspects and propose a detailed financial plan to develop multidisciplinary industrial solutions in societal context
CSD415.03-PO12	**L**	Students will be able to engage in independent and lifelong learning to achieve notable professional skills and come up with workable design solutions
CSD415.03-PSO1	**L**	Students will identify the work plan and methodology by demonstrating professionalism with ethics and applying the foundational concepts of computer science and Engineering.
CSD415.04-PO5	**M**	Students will be able to plan and execute tasks utilizing available resources within timelines, following ethical and professional norms.
CSD415.04-PO8	**H**	Students are able to apply ethical principles and commit to professional ethics during the design of components/ products/ processes of the proposed work.
CSD415.04-PO9	**M**	Understanding of engineering and social aspects help them to identify products which are essential to solve societal, health, safety, legal and cultural problems in diverse team or as an individual in multi-disciplinary settings

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CSD415.04-PO10	**M**	students will communicate effectively during the technical presentation and able to comprehend effectively give and receive clear demonstrations.
CSD415.04-PO11	**H**	Students are able to design components, products, or processes, utilising a systems-based approach by using modern computer aided tools and propose a detailed financial plan to derive the solutions.
CSD415.04-PO12	**M**	Students can use modern engineering tools and practice the life long learning to get design solutions for engineering problems.
CSD415.04-PSO1	**L**	Students may provide innovative solutions to novel problems with the knowledge of foundational engineering concepts.
CSD415.04-PSO2	**L**	Students will apply software Engineering principles and practices, working as a team to analyse problems and to develop quality software
CSD415.04-PSO3	**L**	Students may apply the principles of mathematics and science to identify and formulate the design components, products, or processes, utilising a systems approach by using modern computer aided tools
CSD415.05-PO1	**L**	Students will apply the knowledge in mathematics, science and engineering to Identify technology/research gaps and propose innovative/creative solutions
CSD415.05-PO2	**M**	Students will apply the principles of mathematics and science to Identify technology/research gaps and propose innovative/creative solutions
CSD415.05-PO3	**M**	Students will identify technology/research gaps and propose innovative/creative solutions for complex engineering problems by considering societal aspects like health, safety, legal and cultural in addition to functional aspects
CSD415.05-PO4	**L**	Students shall be able to conduct investigations for complex engineering problems to identify technology/research gaps and propose innovative/creative solutions
CSD415.05-PO5	**M**	With the knowledge about usage of modern tools, the students can propose innovative/creative solutions for complex engineering problems
CSD415.05-PO12	**L**	Students will be able to engage in independent and lifelong learning to achieve notable professional skills and come up with workable design solutions
CSD415.05-PSO1	**H**	Students will be able to identify technology/research gaps and propose innovative/creative solutions by applying foundational concepts of Computer Science & Engineering.
CSD415.05-PSO2	**H**	Students will apply software Engineering principles and practices to identify technology/research gaps and propose innovative/creative solutions

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CSD415.05-PSO3	**H**	Students will adapt emerging technologies during the development of components, products and processes for innovative/creative solutions
CSD415.06-PO5	**M**	With the knowledge of modern tools, students will be able to organize and communicate technical and scientific findings effectively in written and oral forms
CSD415.06-PO8	**M**	Students will be able to organize and communicate technical and scientific findings effectively in written and oral forms by applying ethical principles.
CSD415.06-PO9	**M**	Students will be able to organize and communicate technical and scientific findings effectively in written and oral forms by working as a team.
CSD415.06-PO10	**H**	Students will be able to organize and communicate technical and scientific findings effectively in written and oral forms
CSD415.06-PO11	**L**	Students will be able to manage, organize and communicate technical and scientific findings effectively in written and oral forms by considering the financial feasibility
CSD415.06-PO12	**L**	Students will be able to organize and communicate technical and scientific findings effectively in written and oral forms by which they can achieve life long learning

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ATTAINMENT OF COURSE OUTCOMES

Course Outcomes (COs) are the learning skills to be attained by the students after the successful completion of each course. The COs are formed as per the syllabus and curriculum given by the University by considering the Program Outcomes (POs) and Program Specific Outcomes (PSOs).

Fixing the Course Outcome

Each course has a set of Course Outcomes (COs). The COs of a course is set by the faculty in charge who is handling the course by referring the syllabus and in discussion with the course coordinator and is verified by the Program Assessment Committee (PAC). As per Regulation 2019, the course outcomes and CO-PO mapping are provided by the University.

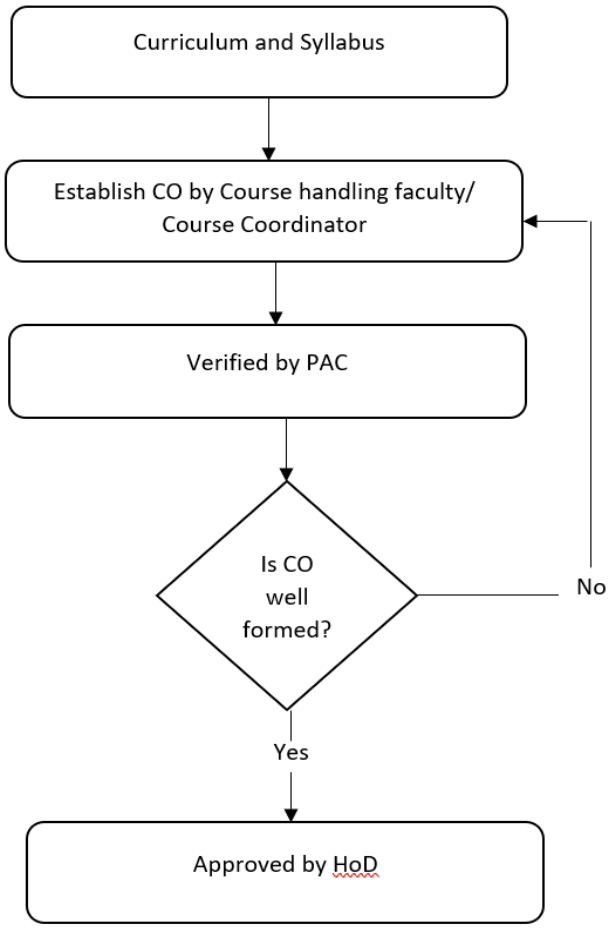

Figure 1: CO Fixation Process

Assessment Tools for the Evaluation of Course Attainment Process

The assessment tools are categorized as direct assessment tools and indirect assessment tools.

Direct assessment tools

- Continuous Internal Evaluation

a. Internal assessment tests
b. Assignments/ seminars/ quizzes

- End-semester examination

Indirect assessment tools

- Course exit survey

The assessment tools and data collection methods used are listed in Table 3.2.1a.

Assessment Tools	Assessment Criteria	Data Collection	Faculty Responsible
Continuous Internal Evaluation	Performance of two internal assessment tests and assignments	After the completion of every assessment test and the submission of each assignment.	Course handling faculty
Course Exit Survey	Filling up of course exit survey	After completion of the course.	Course handling faculty
University Result	The grade obtained in the University exam.	After the publication of the University result.	Course handling faculty

Table 1: Assessment Tools and Data Collection Methods

Assessment process of theory course:

The theory course has been assessed using direct and indirect assessment tools. Direct assessment tools include two internal assessment tests, two (R 2019) or three (R 2015) assignments/seminars/Quizzes, and the grades secured in the University examination. Indirect attainment is done through a course exit survey.

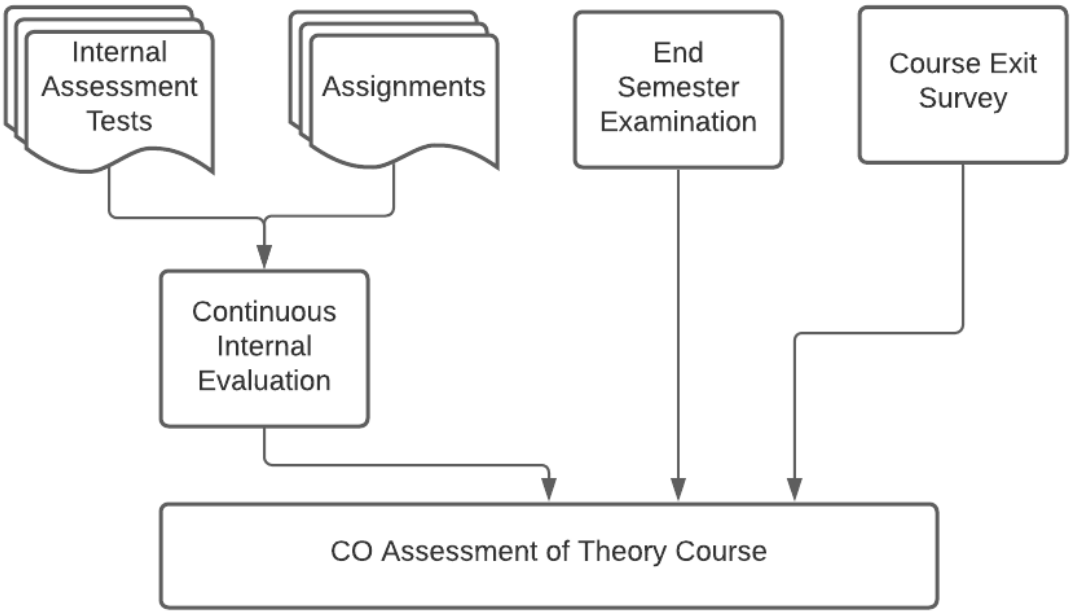

Figure 2: Process of CO Assessment of Theory Course

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CONTINUOUS INTERNAL EVALUATION:

Continuous internal evaluation of a student is carried out by conducting internal assessment tests and assignments/quizzes/seminars.

- **Internal Assessment Test**

- Two internal assessment tests are scheduled in accordance with the academic calendar.
- The entire exam schedule is supervised by the Exam cell.
- The course handling faculty prepares the question paper for the respective course in accordance with the revised blooms taxonomy and is submitted to the scrutiny committee to verify the quality and correctness of the question paper and approved by HoD.
- The question paper will be collected by the exam cell coordinator of the department well in advance and forwarded to the exam cell.
- The course-handling faculty prepares evaluation scheme/answer key for each test and evaluates the performance of students as per the evaluation scheme.

- **Assignment/Seminar/Quiz**

- The assignments are planned by the course handling faculty while preparing the course plan.
- The assignment questions are mapped with corresponding COs and knowledge level.
- A minimum time is provided for the students for completing the assignments.
- Bright students are encouraged to present seminars on topics of interest relevant to the course.

End Semester Examination

- Conducted as per the University schedule after the completion of the semester.
- The question paper setting, answer script evaluation, and result publication are done by the University.

Assessment process for Laboratory courses

- Each student is provided with a computer system for working out the experiments.
- Students come well-prepared with the procedure/algorithm of the experiment.
- The students are permitted to take only the observation book inside the laboratory.

- **Performance, Viva and Record**

- Students should complete the experiment within the allotted time given to them. One week will be given to complete the experiment given in a particular day. They can utilize the laboratory facility in the evening or afternoon in consultation with the course handling faculty if they are not able to complete the experiments in the regular lab timings.
- The students will record the program output and get it verified by the course handling faculty and submit it on or before the next lab session.
- In each lab session a viva, based on the experiment, will be conducted to test the technical knowledge of the student. It is either conducted as a quiz in LMS or as an oral viva.
- The student's continuous internal evaluation is based on the performance in the lab, viva, internal assessment test, and record/observation.

- **End Semester Examinations**

R 2015

- At the end of the semester, an end-semester examination will be conducted internally by the college as prescribed by the University.
- Two examiners from the department other than the course handling faculty will conduct the lab examination.
- The examiners are appointed by the Head of the Department.
- After the examination, marks will be tabulated and the answer scripts and marks of the examination are sealed in a cover by the examiner who conducted the examination and the cover will be handed over to the examination cell coordinator of the department.

R 2019

- After completion of the lab course, an internal lab exam will be conducted by the course handling faculty.
- The end semester examination will be conducted by the University by assigning internal and external examiners.

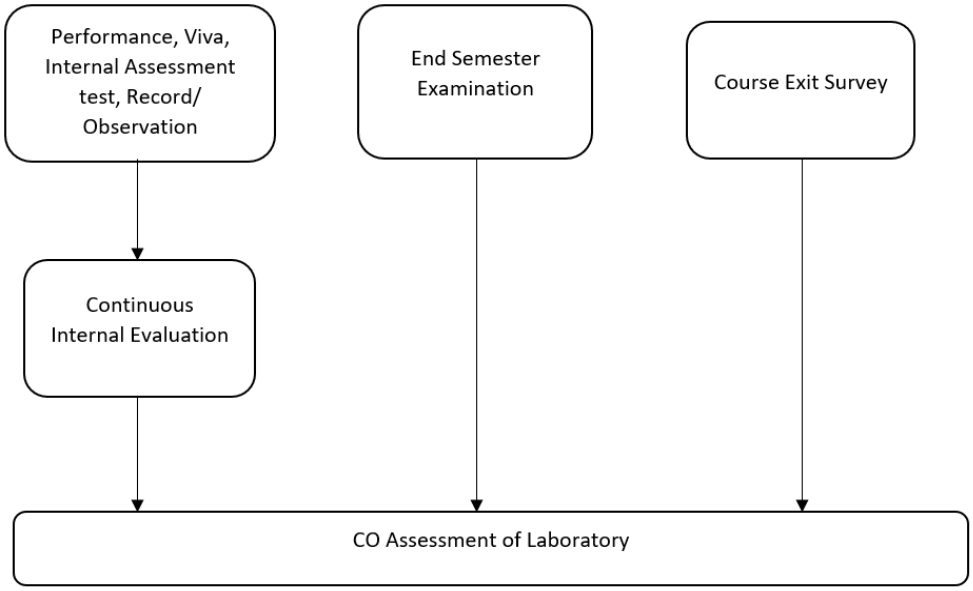

Figure 3: Process of CO Figure Assessment of Laboratory courses

Assessment process of Project and Seminar Work:

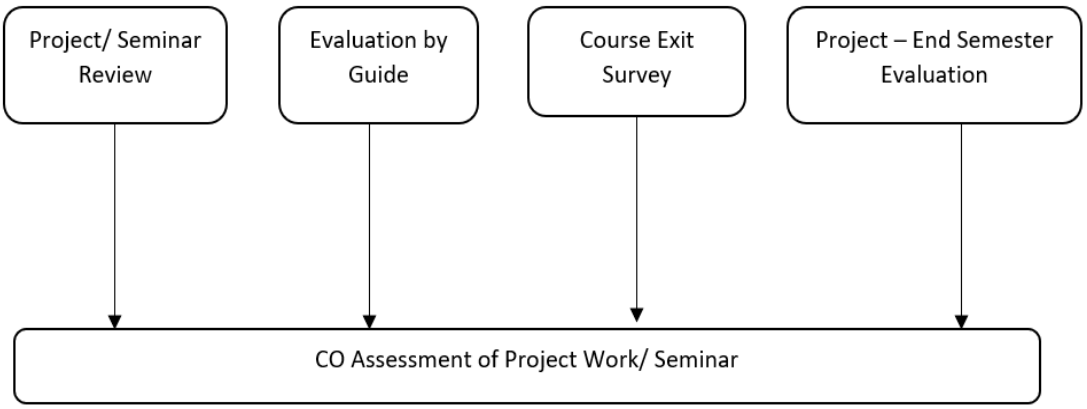

Figure 4: Process of Assessment of Project/Seminar

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

- **Project/Seminar Review**

- The project coordinator forms the project guidelines and evaluation rubrics.
- Project batches are formed based on the area of interest of the students.
- Internal guides are allotted to the project batches based on the specialization and competency skills of the faculty members and area of interest of the students.
- A project evaluation panel is constituted by the Head of the Department to conduct the project reviews.
- The students will submit the project idea. The project evaluation panel will review and accept the project based on the feasibility and impact of the project.
- The evaluation panel members conduct two project reviews and submit the internal assessment marks to the Coordinator.
- The department encourages students to participate in technical expo/project competitions. The project guides motivate and guide the students to publish in standard conference/journal forums.
- The project coordinator motivates the students to apply for student project funding schemes from Government organizations/NGOs.
- The final assessment of the project is done through a demonstration of the project with a technical presentation. A project report should be submitted to the project evaluation panel.

- **Evaluation by the guide**

- Each internal guide will continuously monitor the project teams under him/her to observe the progress of the project work
- The project guide assesses the students based on their overall performance and the evaluation marks are handed over to the project coordinator.

Course Exit Survey

Course exit survey for all courses is conducted after the completion of each course. A survey form is provided to the students by the course handling faculty which contains questions to measure the effectiveness of the course.

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COURSE OUTCOME ATTAINMENT EVALUATION PROCESS

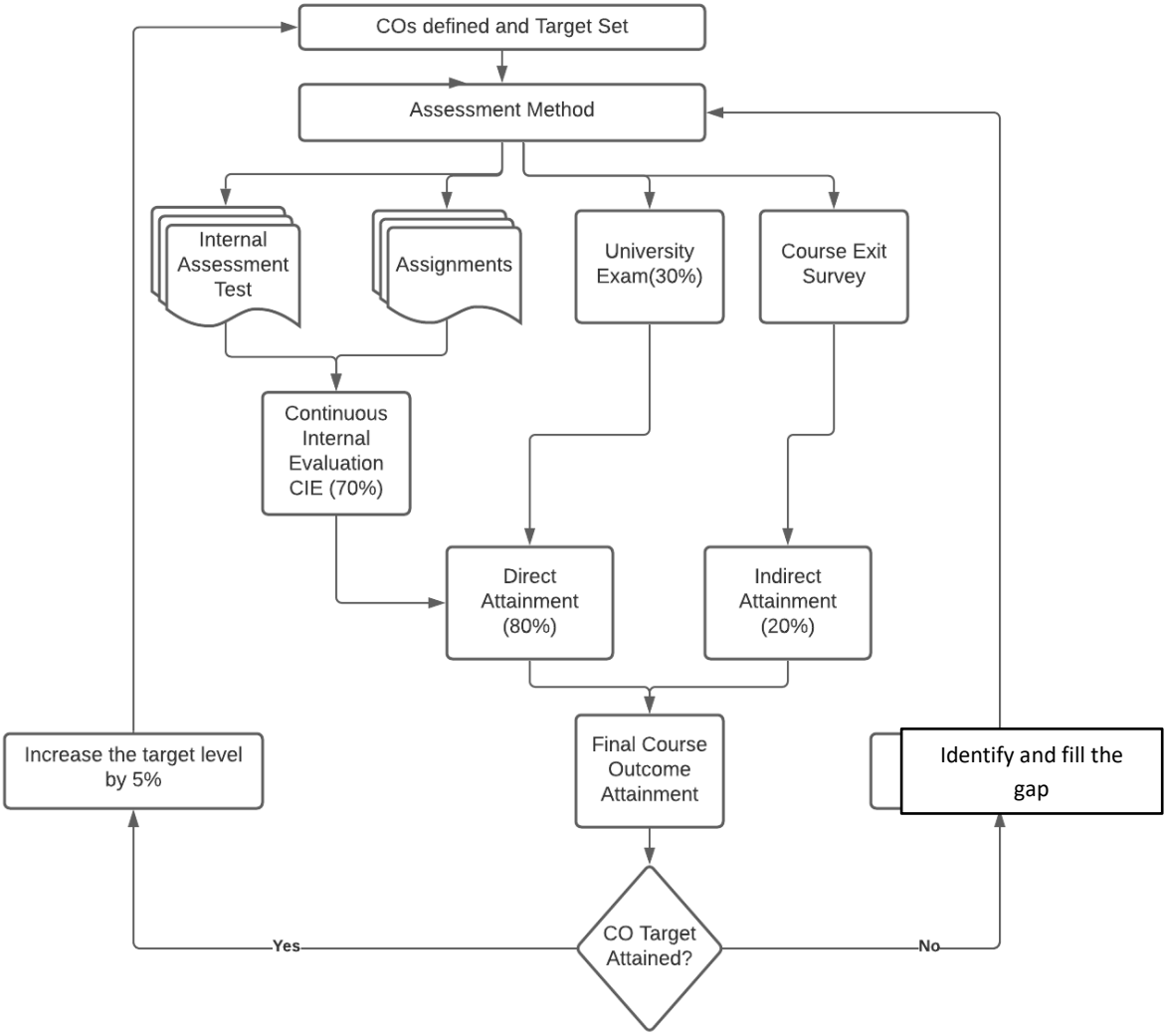

Figure 5: CO Attainment Evaluation Process

Fixing the target value of Course outcome

The Internal Quality Assurance Cell (IQAC) of the college has decided to set the initial target value of course outcomes of each course based on the level of **cognitive skills**. The criteria for setting initial targets are given below.

KNOWLEDGE LEVEL	TARGET VALUE
Apply and above levels (K3 – K6)	50%
Understanding level (K2)	60%
Remembering Level (K1)	70%

Table 2: CO Target Value Fixation

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Example:

Course Name: Data Structures **Course code: C204** **Semester: S3**

COURSE CODE	COURSE OUTCOME STATEMENTS	TARGET
C204.CO1	Compare different programming methodologies and define asymptotic notations to analyse the performance of the algorithm (K2)	60%
C204.CO2	Utilize appropriate data structures like arrays linked lists, stacks, and queues to solve real-world problems efficiently (K3)	50%
C204.CO3	Explain different memory management techniques and their applications (K2)	60%
C204.CO4	Construct and manipulate data using non-linear data structures like trees and graphs to design algorithms for various applications (K3)	50%
C204.CO5	Select various searching and sorting techniques (K2)	60%
C204.CO6	Illustrate various hashing techniques (K2)	60%

Table 3. Sample Course Outcome Target

Setting the weightage values for direct and indirect attainment

The attainment is evaluated by direct and indirect assessment. The direct assessment method includes continuous internal assessment and end-semester examination. The indirect assessment method includes Course Exit Survey.

The Internal Quality Assurance Cell (IQAC) of the college has decided to set the attainment levels of direct and indirect attainment as follows.

Attainment Type	Percentage of Consideration
Direct Attainment	80%
Indirect Attainment	20%

Table 4. Attainment Contribution

Measuring Course Outcomes attained through University Examinations

The Department Advisory Committee (DAC) has fixed the initial target grade of the University examination based on the previous results of the same course. If the course is new, the complexity level of the course is considered to set the target value. Based on the percentage of the students attaining the specified target value, the attainment level is set. The assessment rubrics for course outcome attainment are given below.

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Rubrics for Course Outcome Attainment

	Assessment tools	Attainment Method	Attainment levels			
			(3)	(2)	(1)	(0)
Course Outcomes	Continuous Internal Evaluation (70%)	Direct Attainment (80%)	> 70% of students scoring a target value of marks	> 60% and <= 70% of students scoring a target value of marks	>50% and <= 60% of students scoring a target value of marks.	< 50% of students scoring a target value of marks
	End Semester Examination (30%)		> 70% of students scoring a target grade	> 60% and <= 70% of students scoring a target grade	>50% and <= 60% of students scoring a target grade	< 50% of students scoring a target grade
	Course Exit Survey	Indirect Attainment (20%)	> 70% of students scoring a target value of marks	> 60% and <= 70% of students scoring a target value of marks	>50% and <= 60% of students scoring a target value of marks.	< 50% of students scoring a target value of marks

Table 6: Course Outcome Assessment Rubrics

The college is affiliated to APJ Abdul Kalam Technological University from 2015 admission onwards. The regulations and curriculum were revised from 2019 onwards where the course outcome and CO-PO mapping are provided by the University. The grading system for the University regulations 2015 and Regulations 2019 is given below**.**

Grading System of Regulation 2015

Grades	Grade point	Total marks obtained
O (S)	10	90% & above
A+	9	85 % & above, less than 90 %
A	8	80 % above, less than 85 %
B+	7	70 % above, less than 80 %
B	6	60 % above, less than 70 %
C	5	50 % above, less than 60 %

P	4	45 % above, less than 50%
F	0	Less than 45 %, (Failed)
FE	0	Failed due to ineligibility
I	0	Incomplete (for Lab/ Workshops)

Table 7: Grading of Regulation 2015

Grading System of Regulation 2019

Grades	Grade Point (GP)	% of Total Marks obtained in the course
S	10	90% and above
A+	9.0	85% and above but less than 90%
A	8.5	80% and above but less than 85%
B+	8.0	75% and above but less than 80%
B	7.5	70% and above but less than 75%
C+	7.0	65% and above but less than 70%
C	6.5	60% and above but less than 65%
D	6.0	55% and above but less than 60%
P(Pass)	5.5	50% and above but less than 55%
F(Fail)	0	Below 50% (CIE + ESE) or Below 40 % for ESE
FE	0	Failed due to lack of eligibility criteria
I	0	Could not appear for the end semester examination but fulfils the eligibility criteria.

Table 8: Grading System of Regulation 2019

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Example for CO attainment Evaluation C313 Software Engineering and Project Management

Cos	Attainment of Internal assessment Test 1	Attainment of Internal assessment Test 2	Attainment of Assignments	Total Attainment of CIE (Average of the applicable attainment)	Attainment of End Semester Examination (ESE)	Direct CO Attainment (70% of CIE+30% of ESE)	Indirect CO Attainment	CO Attainment (80% of direct attainment+20% of indirect attainment)
C313.CO1	1	-	-	1	3	1.6	0	1.28
C313.CO2	0	-	3	1.5	3	1.95	3	2.16
C313.CO3	-	3	3	3	3	3	3	3
C313.CO4	-	3	-	3	3	3	3	3
C313.CO5	-	3	3	3	3	3	3	3
Average				**2.3**	**3**	**2.51**	**2.4**	**2.49**

Table 9: CO Attainment evaluation of C313

Course Outcome Attainment: 2016-20 Batch

COURSE	COURSE NAME	CO1	CO2	CO3	CO4	CO5	CO6	CO7
C301	Theory of Computation	3	3	2.82	1.88	3	3	-
C302	System Software	3	3	3	3	3	3	-
C303	Microprocessors and Microcontrollers	3	3	3	3	3	3	-
C304	Data Communication	2.72	3	3	3	3	3	-
C305	Graph Theory and Combinatorics	2.27	2.27	2.27	2.27	1.71	1.71	-
C306	Soft Computing	2.04	1.32	3	3	3	-	-
C307	Design Project	3	3	3	3	3	-	-
C308	System Software Lab	3	3	3	3	3	3	-
C309	Application Software Development Lab	3	3	3	3	3	3	-
C310	Design and Analysis of Algorithms	2.72	2.72	2.72	3	3	3	-
C311	Compiler Design	3	3	3	3	2.16	2.8	-
C312	Computer Networks	3	1.32	2.44	2.44	3	-	-
C313	Software Engineering and Project Management	1.28	2.16	3	3	3	-	-
C314	Principles of Management	1.44	0.6	1.16	1.72	2	2	-

C315	Computer Vision	2.76	2.2	2.2	2.76	2.76		-
C316	Mobile Computing	2	2.28	0.6	0.6	2.28	2.28	-
C317	Web Technologies	1.92	2.76	2.76	2.76	2.2	2.76	-
C318	Microprocessor Lab	3	3	3	3	-	-	-
C319	Network Programming Lab	3	3	3	-	-	-	-
C320	Comprehensive Exam	2.28	2.28	2.28	2.28	2.28	2.28	-
C401	Computer Graphics	2.52	2.24	2.24	2.24	1.96	2.52	2.52
C402	Programming Paradigms	2	1.44	2.28	2	2.28	1.44	-
C403	Computer System Architecture	2.24	1.4	1.68	1.96	2.52	2.52	-
C404	Distributed Computing	2.28	0.6	2	1.72	2.28	2.28	-
C405	Cryptography and Network Security	2.44	3	2.44	2.16	3	-	-
C406	Bio Informatics	2.28	1.72	2.28	2.28	2.28	2.28	-
C407	Machine Learning	2.16	2.44	3	3	2.8	1.88	-
C408	Seminar & Project Preliminary	3	3	3	3	3	-	-
C409	Compiler Design Lab	3	3	3	3	3	3	-
C410	Data Mining and Ware Housing	3	3	3	3	3	2.44	-
C411	Cloud Computing	1.12	2.16	2.16	3	3	3	-
C412	Principles of Information Security	3	3	3	3	3	3	-
C413	Embedded Systems	3	3	2.72	3	3	3	-
C414	Project	3	3	3	3	-	-	-

Table 10: Sample CO Attainment

Course Outcome Attainment: 2017-21 Batch

COURSE	COURSE NAME	CO1	CO2	CO3	CO4	CO5	CO6	CO7
C201	Linear Algebra & Complex Analysis	3	3	3	1.88	2.16	1.88	-
C202	Discrete Computational Structures	3	3	3	3	3	3	-
C203	Switching Theory and Logic Design	3	3	3	2.16	1.32	2.16	-

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C204	Data Structures	3	3	2.16	3	3	3	-
C205	Electronics Devices & Circuits	2.24	0.84	1.96	0.84	2.52	2.52	-
C206	Life Skills	2.28	2.28	2.28	2.28	2.28	2.28	-
C207	Data Structures Lab	3	3	3	3	3	3	-
C208	Electronics Circuits Lab	3	3	3	3	3	3	-
C209	Probability Distributions, Transforms and Numerical Methods	2.24	1.96	2.24	2.52	2.52	2.52	-
C210	Computer Organization and Architecture	1.64	2.76	2.2	2.48	2.76	-	-
C211	Operating Systems	2.16	1.32	2.44	2.72	3	3	-
C212	Object Oriented Design and Programming	2.76	2.48	2.48	2.76	1.92	2.76	-
C213	Principles of Database Design	2.09	2.27	2.26	1.9	1.7	1.9	-
C214	Business Economics	3	3	3	2.44	3	2.44	-
C215	Free and Open Source Software Lab	3	3	3	3	3	-	-
C216	Digital Systems Lab	2.52	2.52	2.52	2.52	2.52	2.52	-
C301	Theory of Computation	3	2.16	2.82	2.44	3	3	-
C302	System Software	3	2.44	2.72	2.44	2.44	3	-
C303	Microprocessors and Microcontrollers	1.68	1.68	1.4	2.52	2.52	2.52	-
C304	Data Communication	2.16	2.16	2.72	2.72	3	3	-
C305	Graph Theory and Combinatorics	3	3	3	3	3	3	-
C306	Soft Computing	1.76	2.44	1.76	2.6	3	-	-
C307	Design Project	3	2.6	3	3	2.6	-	-
C308	System Software Lab	3	3	3	3	3	3	-
C309	Application Software Development Lab	3	3	3	3	3	3	-
C310	Design and Analysis of Algorithms	2.16	2.44	3	3	3	-	-
C311	Compiler Design	1.32	1.32	2.44	3	3	3	-
C312	Computer Networks	1.32	1.88	3	3	2.44	-	-

C313	Software Engineering and Project Management	2.16	2.16	2.16	2.16	1	-	-
C314	Principles of Management	1.32	2.16	1.32	3	2.44	2.16	-
C315	Computer Vision	2.48	2.2	2.2	2.76	2.76	-	-
C316	Mobile Computing	1.88	2.44	1.88	3	3	3	-
C317	Web Technologies	2.12	3	3	3	3	3	
C318	Microprocessor Lab	3	3	3	3	-	-	-
C319	Network Programming Lab	3	3	3	-	-	-	-
C320	Comprehensive Exam	3	3	3	3	3	3	-
C401	Computer Graphics	3	3	3	3	3	3	2.72
C402	Programming Paradigms	2.72	3	3	3	3	3	-
C403	Computer System Architecture	2.76	2.76	1.92	2.76	2.2	2.2	-
C404	Distributed Computing	3	3	3	3	3	3	-
C405	Cryptography and Network Security	3	3	1.88	3	3	3	-
C406	Bio Informatics	3	3	3	2.8	2.16	3	-
C407	Machine Learning	2.16	1.32	3	2.44	2.44	1.32	-
C408	Seminar & Project Preliminary	2.76	2.76	2.76	2.76	2.76	-	-
C409	Compiler Design Lab	3	3	3	3	3	3	-
C410	Data Mining and Ware Housing	3	3	3	3	3	3	3
C411	Cloud Computing	2.8	3	3	3	3	3	-
C412	Principles of Information Security	3	3	3	3	3	3	-
C413	Embedded Systems	3	3	3	3	3	2.16	-
C414	Project	2.28	2.28	2.28	2.28	-	-	-

Table 11: Sample CO Attainment

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ATTAINMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

POs & PSOs are assessed based on direct and indirect methods. The assessment tools used for the attainment of Program Outcomes and Program Specific Outcomes are as follows:

Direct attainment method
The direct CO-PO-PSO attainment values are calculated from the course attainment.

Indirect Attainment Method
Indirect attainment is calculated by considering programme exit survey, alumni survey, and employer survey. Each of these surveys is taken once every year. A program exit survey is conducted for final-year students at the end of the programme. The survey is evaluated on a five-point scale.

Scale	Value
5	Excellent
4	Very Good
3	Good
2	Satisfactory
1	Poor

Table 12 Program Exit Survey scale

PO-PSO ATTAINMENT CALCULATION

The attainment calculation of the PO and PSO is done by taking 80% of the direct attainment and 20% of the indirect attainment.

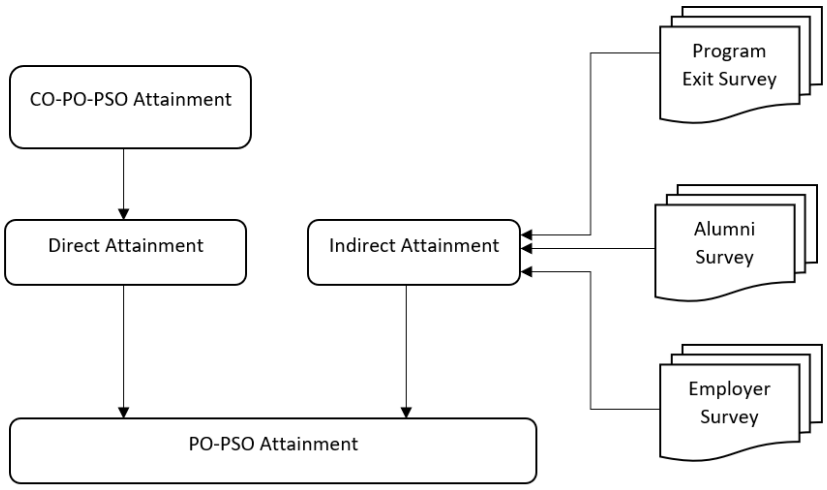

Figure 6:PO-PSO Attainment Evaluation Procedure

Example:

The PO/PSO attainment for the course C204 Data Structures is shown in table 13

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C204.CO1	3	3	3	2	-	1	-	1	-	1	-	3	3	3	-
C204.CO2	3	2	3	2	-	1	-	1	-	1	-	3	3	3	-
C204.CO3	2.72	2.72	2.72	1.81	-	0.91	-	0.91	-	0.91	-	2.72	2.72	2.72	-
C204.CO4	3	3	3	3	-	2	-	1	-	1	-	3	3	3	-
C204.CO5	3	2	3	3	-	2	-	1	-	1	-	3	3	3	-
C204.CO6	3	2	3	3	-	2	-	1	-	1	-	3	3	3	-
Average CO-PO Attainment	**2.95**	**2.45**	**2.95**	**2.47**	**-**	**1.49**	**-**	**0.99**	**-**	**0.99**	**-**	**2.95**	**2.95**	**2.95**	**-**

Table 13: PO/PSO direct attainment for C204

The direct PO/PSO attainment is calculated as the average of the PO/PSO attainments from all the courses of four years. 80% of direct PO/PSO attainment is added with 20% of indirect PO/PSO attainment to get the final PO/PSO attainment.