Students performance and learning outcome

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Course outcomes

SEMESTER - 1 & 2

Course code	Course Name		Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
		CO 1	solve systems of linear equations, diagonalize matrices and characterise	3	3	3	3	2	1			1	2		2
		CO 2	compute the partial and total derivatives and maxima and minima of	3	3	3	3	2	1			1	2		2
MAT 101	LINEAR ALGEBRA AND	CO 3	compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas	3	3	3	3	2	1			1	2		2
	CALCULUS	CO 4	perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent	3	2	3	2	1	1			1	2		2
		CO 5	Determine the Taylor and Fourier series expansion of functions and learn	3	3	3	3	2	1			1	2		2
		CO 1	Compute the quantitative aspects of waves and oscillations in engineering systems.	3	2						1	2			1
		CO 2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.	3	2						1	2			1
PHT 100	ENGINEERING PHYSICS A (FOR CIRCUIT	CO 3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.	3	2						1	2			1
	BRANCHES)	CO 4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems	3	1						1	2			1
		CO 5	Analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system	3	1						1	2			1
		CO 1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.	1	2	1									
		CO 2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.	1	1		1	2							
CYT 100	ENGINEERING CHEMISTRY	CO 3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials.	1	1		1	2							
		CO 4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.	2	1										
		CO 5	Study various types of water treatment methods to develop skills for treating wastewater.	1			1			3					

					1	1								
		CO 1	Recall principles and theorems related to rigid body mechanics	2	2									
		CO 2	Identify and describe the components of system of forces acting on the rigid body	3	3									
EST 100	ENGINEERING MECHANICS	CO 3	Apply the conditions of equilibrium to various practical problems involving different force system	3	3									
		CO 4	Choose appropriate theorems, principles or formulae to solve problems of mechanics	3	3									
		CO 5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses	3	3									
		CO 1	Draw the projection of points and lines located in different quadrants	3										
		CO 2	Prepare multiview orthographic projections of objects by visualizing them in different positions	3										
EST 110	ENGINEERING	CO 3	Draw sectional views and develop surfaces of a given object	3	1									
ESI 110	GRAPHICS	CO 4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.	3									1	
		CO 5	Convert 3D views to orthographic views	3									2	
		CO 6	Obtain multiview projections and solid models of objects using CAD tools	3				3					3	
		CO 1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.	3					3	2	2			
		CO 2	Explain different types of buildings, building components, building materials and building construction	3	2						3			
		CO 3	Describe the importance, objectives and principles of surveying.	3	2				2	3		2		
	BASICS OF CIVIL	CO 4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps	3	2		1	3				2		
EST 120	& MECHANICAL ENGINEERING	CO 5	Discuss the Materials, energy systems, water management and environment for green buildings.	3	2			3				2		
		CO 6	Analyse thermodynamic cycles and calculate its efficiency	3	2			3						
		CO 7	Illustrate the working and features of IC Engines	3	1			3						
		CO 8	Explain the basic principles of Refrigeration and Air Conditioning	3	1									
		CO 9	Describe the working of hydraulic machines	3	2									
		CO 10	Explain the working of power transmission elements	3	1									
		CO 11	Describe the basic manufacturing, metal joining and machining processes	3										

		CO 1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits	3	1									2
	BASICS OF	CO 2	Develop and solve models of magnetic circuits	3	1									2
EST 130	ELECTRICAL AND	CO 3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state	3	1									2
150	ELECTRONICS ENGINEERING	CO 4	Describe working of a voltage amplifier	2										
		CO 5	Outline the principle of an electronic instrumentation system	2										2
		CO 6	Explain the principle of radio and cellular communication	2										2
		CO 1	Define and Identify different life skills required in personal and professional l						2	1	2	2	1	3
		CO 2	Develop an awareness of the self and apply well-defined techniques to cope with emotions								3			2
HUN 101	LIFE SKILLS	CO 3	Explain the basic mechanics of effective communication and demonstrate these through						1		1	3		
		CO 4	Take part in group discussions									3		1
		CO 5	Use appropriate thinking and problem solving techniques to solve new problems		3		2	1						
		CO 6	Understand the basics of teamwork and leadership						1		3			
		CO 1	Compute the derivatives and line integrals of vector functions and learn their applications	3	3	3	3	2	1		1	2		2
	VECTOR CALCULUS,	CO 2	Evaluate surface and volume integrals and learn their inter-relations and applications	3	3	3	3	2	1		1	2		2
MAT 102	DIFFERENTIAL EQUATIONS	CO 3	Solve homogeneous and non-homogeneous linear differential equation with constant	3	3	3	3	2	1		1	2		2
	AND TRANSFORMS	CO 4	Compute Laplace transform and apply them to solve ODEs arising in engineering	3	3	3	3	2	1		1	2		2
		CO 5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering	3	3	3	3	2	1		1	2		2
		CO 1	Develop vocabulary and language skills relevant to engineering as a profession									3		2
		CO 2	Analyze, interpret and effectively summarize a variety of textual content									1		3
	PROFESSIONAL	CO 3	Create effective technical presentations						1		1	3		
HUN 102	COMMUNICATI	CO 4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus									3		1
	010	CO 5	Identify drawbacks in listening patterns and apply listening techniques for specific needs		1						2	3		
		CO 6	Create professional and technical documents that are clear and adhering to all the necessary conventions	1					1		1	3		

		CO 1	Analyze a computational problem and develop an algorithm/flowchart to find its solution	3	2	3	2		2			1	1	1
		CO 2	Develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.	3	2	3	2	2				1		1
EST 102	PROGRAMING	CO 3	Write readable C programs with arrays, structure or union for storing the data to be processed	3	2	3	2	2				1		1
102	IN C	CO 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	3	2	3	2	2				1	1	1
		CO 5	Write readable C programs which use pointers for array processing and parameter passing	3	2			2				1		1
		CO 6	Develop readable C programs with files for reading input and storing output	3	2			2				1		1
		CO 1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories					3		1	2			1
		CO 2	Understand the need for precise measurement practices for data recording					3		1	2			1
PHL 120	ENGINEERING PHYSICS LAB	CO 3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations					3		1	2			1
		CO 4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics					3		1	2			1
		CO 5	Develop basic communication skills through working in groups in performing the laboratory					3		1	2			1
		CO 1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various	3				2						
		CO 2	practical skill to use TLC for the identification of drugs	3				3						
CNI	ENGINEERING	CO 3	spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds	3				3						
CYL 120	CHEMISTRY LAB	CO 4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis	3				3						
		CO 5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments	3				1						
		CO 6	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum	3				1						

			Name different devices and tools used for civil engineering measurements		r					r	-		
		CO 1	Name different devices and tools used for civil engineering measurements	1			1	1		2	2		
		CO 2	Explain the use of various tools and devices for various field measurements	1			1	1		2	2		
	CIVIL &	CO 3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing	1			1	1	2	2	2	1	
ESL 120	MECHANICAL WORKSHOP	CO 4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.	1			1	1	2	2	2	1	1
		CO 5	Compare different techniques and devices used in civil engineering	1			1	1		2	2		1
		CO 6	Identify Basic Mechanical workshop operations in accordance with the material and objects	1									
		CO 7	Apply appropriate Tools and Instruments with respect to the mechanical	2									
		CO 8	Apply appropriate safety measures with respect to the mechanical workshop to	2									
		CO 1	Demonstrate safety measures against electric shocks					3					1
		CO 2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries	2							1		
ESL 130	ELECTRICAL & ELECTRONICS	CO 3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings	2		1		1	1	2	2		2
LSL 150	WORKSHOP	CO 4	Identify and test various electronic components	3									2
		CO 5	Draw circuit schematics with EDA tools	3			2						2
		CO 6	Assemble and test electronic circuits on boards	3			2						1
		CO 7	Work in a team with good interpersonal skills							3	2		2

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		CO 1	Check the validity of predicates in Propositional and Quantified Propositional Logic	2	2	2	2								
		CO 2	Solve counting problems by applying the elementary counting techniques - Rule of Sum, Rule of Product, Permutation, Combination, Binomial Theorem, Pigeonhole Principle and Principle of Inclusion and Exclusion	2	2	2	2								
MAT203	AT203 DISCRETE MATHEMATICS	CO 3	Classify binary relations into various types and illustrate an application for each type	2	2	2	2		1						1
		CO 4	Explain Generating Functions and solve First Order and Second Order Linear Recurrence Relations with Constant Coefficients	2	2	2	2		1						1
		CO 5	Illustrate the abstract algebraic systems - Semigroups, Monoids, Groups, Homomorphism and Isomorphism of Monoids and Groups	2	2	2	2		1						1

		CO 1	Design an algorithm for a computational task and calculate the time/space complexities of that algorithm	3	3	2	2		1			2
		CO 2	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	2	2	3	2		1			1
CST201	DATA STRUCTURES	CO 3	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	3	2	3	2		2			1
		CO 4	Store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set	3	1	2	3		1			2
		CO5	Select appropriate sorting algorithms to be used in specific circumstances	3	2	3	3		1			2
		CO6	Design and implement Data Structures for solving real world problems efficiently	3	2	3	2		2			2
		CO 1	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	3	2							2
CST 203	LOGIC SYSTEM	CO 2	Simplify a given Boolean Function and design a combinational circuit to implement the simplified function using Digital Logic Gates	3	2	1	2		2			2
	DESIGN	CO 3	Design combinational circuits - Adders, Code Convertors, Decoders, Magnitude Comparators, Parity Generator/Checker and design the Programmable Logic Devices -ROM and PLA.	3	2	3	2		2			2
		CO 4	Design sequential circuits - Registers, Counters and Shift Registers.	2	1	3	1		1			1
		CO 5	Use algorithms to perform addition and subtraction on binary, BCD and floating point numbers	2	2	2						2
		CO 1	Write Java programs using the object oriented concepts - classes, objects, constructors, data hiding, inheritance and polymorphism	1	1	3						
	OBJECT	CO 2	Utilise datatypes, operators, control statements, built in packages & interfaces, Input/ Output Streams and Files in Java to develop programs	2	2	2						
CST 205	ORIENTED PROGRAMMING	CO 3	Illustrate how robust programs can be written in Java using exception handling	2	3	3						
	USING JAVA	CO 4	Write application programs in Java using multithreading and database connectivity	3	2	2						
		CO 5	Write Graphical User Interface based application programs by utilising event handling features and Swing in Java	1	2	2		2			3	

		CO 1	Explain the different concepts and principles involved in design engineering.	2	1				1			1		
EST 200	DESIGN AND	CO 2	Apply design thinking while learning and practicing engineering.		2			1		1				2
E31 200	ENGINEERING	CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.			2		1	1		2	2		1
		CO 1	Understand the core values that shape the ethical behaviour of a professional.							2			2	
		CO 2	Adopt a good character and follow an ethical life.							2			2	
HUT 200	PROFESSIONAL ETHICS	CO 3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.							3			2	
		CO 4	Solve moral and ethical problems through exploration and assessment by established experiments.							3			2	
		CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.							3			2	
		CO 1	Understand the relevance and the concept of sustainability and the global initiatives in this direction					2	3					2
	SUSTAINABLE	CO 2	Explain the different types of environmental pollution problems and their sustainable solutions					2	3					2
MCN201	ENGINEERING	CO 3	Discuss the environmental regulations and standards					2	3					2
		CO 4	Outline the concepts related to conventional and non-conventional energy					2	3					2
		CO 5	engineering					2	3					2
		CO 1	Write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements	3	2	3	3	2		1		1		2
		CO 2	Write a time/space efficient program to sort a list of records based on a given key in the record	3	2	3	2			1		1		2
CSL 201	DATA STRUCTURES	CO 3	Examine a given Data Structure to determine its space complexity and time complexities of operations on it	2	2	3	2			1		1		2
C5L 201	LAB	CO 4	Design and implement an efficient data structure to represent given data	2	2	3	2			1		1		2
		CO5	Write a time/space efficient program to convert an arithmetic expression from one notation to another	1	1	2				1		1		1
		CO 6	Write a program using linked lists to simulate Memory Allocation and Garbage Collection	1	1	2				1		1		1
	OBJECT	CO 1	Implement the Object Oriented concepts - constructors, inheritance, method overloading & overriding and polymorphism in Java	3	3	3				2				2
CSL 203	ORJECT ORIENTED PROGRAMMING LAB (IN JAVA)	CO 2	Implement programs in Java which use datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and Files	3	3	3				2				2
		CO 3	Implement robust application programs in Java using exception handling	3	3	3				2				2

	OBJECT ORIENTED	CO 4	Implement application programs in Java using multithreading and database connectivity	3	3	3			2		2
CSL 203	PROGRAMMING LAB (IN JAVA)	CO 5	Implement Graphical User Interface based application programs by utilizing event handling features and Swing in Java	3	3	3			2		2

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		CO 1	Explain vertices and their properties, types of paths, classification of graphs and trees & their properties.	3	3	3	3	3	2	2	2	1	2		1
		CO 2	Demonstrate the fundamental theorems on Eulerian and Hamiltonian graphs.	3	3	3	3	3	2	2	2	1	1		1
MAT 206	GRAPH THEORY	CO 3	Illustrate the working of Prim's and Kruskal's algorithms for finding minimum cost spanning tree and Dijkstra's and Floyd-Warshall algorithms	3	3	3	3	2	3	3	3	1	1		2
		CO 4	Illustrate how one can represent a graph in a computer.	3	2	3	3	2	3	3	3	2	1		1
		CO5	Explain the Vertex Color problem in graphs and illustrate an example application	3	2	2			3				2		2
		CO 1	Recognize and express the relevance of basic components, I/O organization and pipelining schemes in a digital computer	2	2	2	1								2
		CO 2	Explain the types of memory systems and mapping functions used in memory systems	3	2	2	1						1		2
CST 202	COMPUTER ORGANIZATION	CO 3	Demonstrate the control signals required for the execution of a given instruction	3	2	2	1						1		2
	AND ARCHITECTURE	CO 4	Illustrate the design of Arithmetic Logic Unit and explain the usage of registers in it	3	2	2	1						1		2
		CO 5	Explain the implementation aspects of arithmetic algorithms in a digital computer	3	2	2							1		2
		CO 6	Develop the control logic for a given arithmetic problem	3	2	2	1								2
		CO 1	Summarize and exemplify fundamental nature and characteristics of database systems	2	2	2									1
		CO 2	Model real word scenarios given as informal descriptions, using Entity Relationship diagrams.	2	2	2	2								1
CST 204	DATABASE MANAGEMENT	CO 3	Model and design solutions for efficiently representing and querying data using relational model	2	2	2	2								1
	SYSTEMS	CO 4	Demonstrate the features of indexing and hashing in database applications	2	2	2							2		1
		CO 5	Discuss and compare the aspects of Concurrency Control and Recovery in Database	2	2	2							2		1
		CO 6	Explain various types of NoSQL databases	1	2	2		3					2		1

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		CO 1	Explain the relevance, structure and functions of Operating Systems in computing devices.	2	1	1							2		3
		CO 2	Illustrate the concepts of process management and process scheduling mechanisms	3	3	3	3						2		3
CST 206	OPERATING SYSTEMS	CO 3	Explain process synchronization in Operating Systems and illustrate process synchronization mechanisms using Mutex Locks, Semaphores and Monitors	3	3	3	3						2		3
	SYSTEMS	CO 4	Explain any one method for detection, prevention, avoidance and recovery for managing deadlocks in Operating Systems.	3	3	3	3						2		3
		CO 5	Explain the memory management algorithms in Operating Systems.	3	2	3	2						2		3
		CO 6	Explain the security aspects and algorithms for file and storage management in Operating Systems.	2	2	1	1						2		3
		CO 1	Explain the different concepts and principles involved in design engineering.	2	1					1			1		
EST 200	DESIGN AND ENGINEERING	CO 2	Apply design thinking while learning and practicing engineering		2				1		1				2
	ENGINEERING	CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.			2			1	1		2	2		1
		CO 1	Understand the core values that shape the ethical behaviour of a professional.								2			2	
		CO 2	Adopt a good character and follow an ethical life.								2			2	
HUT 200	PROFESSIONAL ETHICS	CO 3	Explain the role and responsibility in technological development by keeping personal ethics								3			2	
	ETHICS	CO 4	Solve moral and ethical problems through exploration and assessment by established experiments.								3			2	
		CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.								3			2	
		CO 1	Explain the background of the present constitution of India and features						2	2	2		2		
		CO 2	Utilize the fundamental rights and duties.						3	3	3		3		
MCN202	CONSTITUTION	CO 3	Understand the working of the union executive, parliament and judiciary.						3	2	3		3		
	OF INDIA	CO 4	Understand the working of the state executive, legislature and judiciary.						3	2	3		3		
		CO 5	Utilize the special provisions and statutory institutions.						3	2	3		3		
		CO 6	Show national and patriotic spirit as responsible citizens of the country						3	3	3		2		
		CO 1	Design and implement combinational logic circuits using Logic Gates	3	3	3	2				2				3
CSL 202	DIGITAL LAB	CO 2	Design and implement sequential logic circuits using Integrated Circuits	3	3	3	2				2				3
		CO 3	Simulate functioning of digital circuits using programs written in a Hardware	3	3	3	2	3			2				3
		CO 4	Function effectively as an individual and in a team to accomplish a given	3	3	3	2				2	3			3
	OPERATING	CO 1	Illustrate the use of systems calls in Operating Systems.	3	3	3					1		1		2
CSL 204	SYSTEMS LAB	CO 2	Implement Process Creation and Inter Process Communication in Operating Systems.	3	3	3					1		1		2
		CO 3	Implement Fist Come First Served, Shortest Job First, Round Robin and	3	3	3	2				1		1		2

		CO4	Illustrate the performance of First In First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms.	3	3	3	2		1	1	2
CSL 204	OPERATING SYSTEMS LAB	CO 5	Implement modules for Deadlock Detection and Deadlock Avoidance in Operating Systems.	3	3	3	2		1	1	2
		CO 6	Implement modules for Storage Management and Disk Scheduling in Operating Systems.	3	3	3	2		1	1	1

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		CO 1	Classify a given formal language into Regular, Context-Free, Context Sensitive, Recursive or Recursively Enumerable.	3	3	3									3
CST 301	FORMAL LANUAGES AND	CO 2	Explain a formal representation of a given regular language as a finite state automaton, regular grammar, regular expression and Myhill-Nerode relation.	3	3	3	3								3
	AUTOMATA THEORY	CO 3	Design a Pushdown Automaton and a Context-Free Grammar for a given context-free language.	3	3	3	3								3
		CO 4	Design Turing machines as language acceptors or transducers.	3	2	3	3								3
		CO 5	Explain the notion of decidability.	3	3	3	3								3
		CO 1	Explain the features of computer networks, protocols, and network design models	2	2										
		CO 2	Describe the fundamental characteristics of the physical layer and identify the usage in network communication	2	2	2									
CST303	COMPUTER	CO 3	Explain the design issues of data link layer, link layer protocols, bridges and switches	2	3	3									
	NETWORKS	CO 4	Illustrate wired LAN protocols (IEEE 802.3) and wireless LAN protocols (IEEE 802.11)	2	2	3									
		CO5	Select appropriate routing algorithms, congestion control techniques, and Quality of Service requirements for a network	2	2	2	2								
		CO 6	Illustrate the functions and protocols of the network layer, transport layer, and application layer in inter-networking	2	2	2			2						
		CO 1	Distinguish softwares into system and application software categories.	2	2			2							2
		CO 2	Identify standard and extended architectural features of machines.	2	2	2									2
CST 305	SYSTEM	CO 3	Identify machine dependent features of system software	2	2	2									2
	SOFTWARE	CO 4	Identify machine independent features of system software.	2	2										2
		CO 5	Design algorithms for system softwares and analyze the effect of data structures.	2	2	2	2								2
		CO 6	Understand the features of device drivers and editing & debugging tools.	2	2			2							2

		CO 1	Illustrate the architecture, modes of operation and addressing modes of microprocessors	2	1	1							2
	MICRO	CO 2	Develop 8086 assembly language programs.	2	3	2	2						2
CST 307	PROCESSORS AND MICRO	CO 3	Demonstrate interrupts, its handling and programming in 8086.	2	3	2	2						2
	CONTROLLERS	CO 4	Illustrate how different peripherals (8255,8254,8257) and memory are interfaced with microprocessors.	2	2	2	1						2
		CO 5	Outline features of microcontrollers and develop low level programs.	3	2	2	1						2
		CO1	Demonstrate Traditional and Agile Software Development approaches	3	3	3	3		3			3	
		CO2	Prepare Software Requirement Specification and Software Design for a given problem.	3	3	3	3		3			3	
CST 309	MANAGEMENT OF SOFTWARE	CO3	Justify the significance of design patterns and licensing terms in software development, prepare testing, maintenance and DevOps strategies for a project.	3	3	3	3			3		3	
	SYSTEMS	CO4	Make use of software project management concepts while planning, estimation, scheduling, tracking and change management of a project, with a traditional/agile framework.	3	3	3	3		3		3	3	
		C05	Utilize SQA practices, Process Improvement techniques and Technology advancements in cloud based software models and containers & microservices.	3	3	3	3		3				
		CO 1	Define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the disaster management cycle	1	1	3							
MCN 301	DIASASTER	CO 2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment	2	2	3							
WIEIV 501	MANAGEMENT	CO 3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk	1	1	2	2	3					2
		CO 4	Explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community	2	2	3	2						
MCN 301	DIASASTER	CO 5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions	2	2	3							
WICIN 301	MANAGEMENT	CO 6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level	2	2	3							

		CO 1	Develop 8086 programs and execute it using a microprocessor kit.	2	2	2	2			2		2		2
	SYSTEM SOFTWARE AND	CO 2	Develop 8086 programs and, debug and execute it using MASM assemblers	2	2	2	2			2		2		2
CSL 331		CO 3	Develop and execute programs to interface stepper motor, 8255, 8279 and digital to analog converters with 8086 trainer kit	2	2	2	2			2		2		2
	LAB	CO 4	Implement and execute different scheduling and paging algorithms in OS	2	2	2	2			2		2		2
		CO 5	Design and implement assemblers, Loaders and macroprocessors.	2	2	2	2			2		2		2
		CO 1	Design database schema for a given real world problem-domain using standard design and modeling approaches.	3	3	2		3		3		2		2
		CO 2	Construct queries using SQL for database creation, interaction, modification, and updation.	3	3	2		3		3		2		2
CSL333	DATABASE MANAGEMENT	CO 3	Design and implement triggers and cursors.	3	3	2	2	3		3		2		2
CSL555	SYSTEMS LAB	CO 4	Implement procedures, functions, and control structures using PL/SQL.	3	3	2	2	3		3		2		2
		CO5	Perform CRUD operations in NoSQL Databases.	3	2	2		3		3		2		2
		CO 6	Develop database applications using front-end tools and back-end DBMS.	3	2	2	2	3	3	3	2	2	2	2

Course code	Course Name		Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
		CO 1	Explain the phases in compilation process(lexical analysis, syntax analysis, semantic analysis, intermediate code generation, code optimization and code generation) and model a lexical analyzer	3	2	2	3	3							1
			Model language syntax using Context Free Grammar and develop parse tree representation using leftmost and rightmost derivations	3	2	2	3	2							1
CST302	COMPILER DESIGN		Compare different types of parsers(Bottom-up and Top-down) and construct parser for a given grammar	3	3	3	3	1							1
			Build Syntax Directed Translation for a context free grammar, compare various storage allocation strategies and classify intermediate representations	3	2	2	3								1
		CO 5	Illustrate code optimization and code generation techniques in compilation	3	2	3	3								1

		CO 1	Describe the working principles of graphics devices	3									
		CO 2	Illustrate line drawing, circle drawing and polygon filling algorithms	2	2	2	1						
CST304	COMPUTER GRAPHICS AND	CO 3	Demonstrate geometric representations, transformations on 2D & 3D objects, clipping algorithms and projection algorithms	1	2	2	1						
CS1304	IMAGE PROCESSING	CO 4	Summarize visible surface detection methods	3		3							
	TROCLOSING	CO5	Summarize the concepts of digital image representation, processing and demonstrate pixel relationships	2	2	2	1						
		CO 6	Solve image enhancement and segmentation problems using spatial domain techniques	2	3	2	1						
		CO 1	Analyze any given algorithm and express its time and space complexities in asymptotic notations.	1	1	1	1						2
	ALGORITHM	CO 2	Derive recurrence equations and solve it using Iteration, Recurrence Tree, Substitution and Master's Method to compute time complexity of algorithms.	2	2	3	3						2
CST 306	ANALYSIS AND	CO 3	Illustrate Graph traversal algorithms & applications and Advanced Data Demonstrate Divide-and-conquer, Greedy Strategy, Dynamic programming,	2	2	1	2						1
	DESIGN	CO 4	Branch-and Bound and Backtracking algorithm design techniques	2	2	2	2						2
		CO5	Classify a problem as computationally tractable or intractable, and discuss	2	2								
		CO 6	Identify the suitable design strategy to solve a given problem.	2	2	2	2						2
		CO 1	Comprehend the concepts and applications of data structures	2	2								2
	COMPREHENSIV	CO 2	Comprehend the concepts, functions and algorithms in Operating System	2	2								2
CST308	E COURSE	CO 3	Comprehend the organization and architecture of computer systems	2	2								2
	WORK	CO4	Comprehend the fundamental principles of database design and manipulation	2	2								2
		CO5	Comprehend the concepts in formal languages and automata theory	2	2								2
		CO 1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare	2								1	
		CO 2	rate appropriate decisions regarding volume or output and to evaluate the social cost	2	2			2	2	3		1	
HUT 300	Industrial Economics & Foreign Trade	CO 3	Determine the functional requirement of a firm under various competitive conditions.	2	2	1						1	
		CO 4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society.	2	2	1			1			1	
		CO 5	Determine the impact of changes in global economic policies on the business opportunities of a firm	2	2	1	2					1	

		CO 1	Illustrate the mathematical concepts for data analytics	2	3	2									2
		CO 2	Explain the basic concepts of data analytics	2	3	2	2								2
	DATA	CO 3	Illustrate various predictive and descriptive analytics algorithms	2	3	2	2								2
CST 322	ANALYTICS	CO 4	Describe the key concepts and applications of Big Data Analytics	2	3	2	2								2
		CO5	Demonstrate the usage of Map Reduce paradigm for Big Data Analytics	2	3	2	2	2							2
		CO 6	Use R programming tool to perform data analysis and visualization	2	3	2	2	2							2
		CO 1	Write, test and debug Python programs	3	3	3		3							3
		CO 2	Illustrate uses of conditional (if, if-else and if-elif-else) and iterative (while and for) statements in Python programs.	3	3	3									3
CST362	PROGRAMMING	CO 3	Develop programs by utilizing the Python programming constructs such as Lists, Tuples, Sets a nd Dictionaries.	3	3	3	2	3							3
	IN PYTHON	CO4	Develop graphical user interface for solutions using Python libraries.	3	3	3	1	3							2
		CO5	Implement Object Oriented programs with exception handling.	3	3	3	1	3							3
		CO6	Write programs in Python to process data stored in files by utilizing Numpy, Matplotlib, and Pandas.	3	3	3	3	3	2						2
		CO 1	Use network related commands and configuration files in Linux Operating	3	3	3				2		2			2
	NETWORKING	CO 2	Develop network application programs and protocols.	3	3	3	3			2		2			2
CSL 332	LAB	CO 3	Analyze network traffic using network monitoring tools.	3	3	3	3	2		2		2			2
		CO 4 CO 5	Design and setup a network and configure different network protocols. Develop simulation of fundamental network concepts using a network	3	3	3	3	2	2	2		2			2
		CO 1	Identify technically and economically feasible problems	3	3	3	2	3		3	3	3	3	2	2
		001		3	3	3	2	3		3	3	3	3	2	2
		CO 2	Identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processe	3	2	3	2	3	2	3		3	3	2	2
CSD 334	MINI PROJECT	CO 3	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques	3	3	3	2	3	2	3	2	3	3	2	2
		CO4	Prepare technical report and deliver presentation	3	3	3	2	3	2			3	3	2	3
		CO5	Apply engineering and management principles to achieve the goal of the project	3	2	3	2	3	2	3	2	3	3	2	3

Course code	Course Name		Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
		CO 1	Explain the fundamental concepts of intelligent systems and their architecture.	3											
	ARTIFICIAL	CO 2	Illustrate uninformed and informed search techniques for problem solving in intelligent systems.	3	2										3
CST 401	INTELLIGENCE	CO 3	Solve Constraint Satisfaction Problems using search techniques.	3	2	2	3								3
		CO 4	techniques	2	1	2	3								3
		CO 5	Illustrate different types of learning techniques used in intelligent systems	2	2			3							3
		CO 1	Describe the theories of accident causation and preventive measures of industrial accidents.	2	2				2	2	2				1
		CO 2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping.	2	1	2		1	1	1	1				1
MCN 401	INDUSTRIAL SAFETY ENGINEERING	CO 3	Explain different issues in construction industries.	2	2	2		1	1	1	1	1	1		1
	ENGINEERING	CO 4	Describe various hazards associated with different machines and mechanical material handling.	2	2	2		1	1	1	1	1	1		1
		CO 5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards.	2	2	2	1	1	1	1	1	1	1		1
CST 423	CLOUD	CO 1	Explain the various cloud computing models and services.	2											1
	COMPUTING	CO 2	Demonstrate the significance of implementing virtualization techniques.	2	2	3									1
		CO 3	Explain different cloud enabling technologies and compare private cloud platforms	2											1
		CO 4	Apply appropriate cloud programming methods to solve big data problems.	2	2	3	2	2							1
		CO5	Describe the need for security mechanisms in cloud	2	2										1
		CO 6	Compare the different popular cloud computing platforms	2				2							1
		CO 1	Identify the security services provided against different types of security attacks.	3	3	3									3
		CO 2	Illustrate classical encryption techniques for information hiding.	3	3	2									3
CST 433	SECURITY IN COMPUTING	CO 3	Illustrate symmetric/asymmetric key cryptosystems for securecommunication.	3	3	3		2							3
		CO 4	Explain message integrity and authentication methods in a secure communication scenario.	3	3	3			2						3

		CO5	Interpret public/secret key distribution techniques for secure communication.	3	3	3									3
CST 433	SECURITY IN COMPUTING	605		5	5	5									5
	COMPUTING	CO 6	Identify the effects of intruders, malicious software and distributed denial of service attacks on system security.	3	3	3			2		1				3
		CO 1	Explain renewable energy sources and evaluate the implication of renewable energy. To predict solar radiation at a location	3	3										3
	RENEWABLE	CO 2	Explain solar energy collectors, storages, solar cell characteristics and applications	3	3			1	1	1				1	3
MET 445	ENERGY ENGINEERING	CO 3	Explain the different types of wind power machines and control strategies of wind turbines	3	3			1	1	1				1	3
		CO 4	Explain the ocean energy and conversion devices and different Geothermal sources	3	3			1	1	1				1	3
		CO5	Explain biomass energy conversion devices. Calculate the Net Present value and payback period	3	3			1	1	1				1	3
		CO 1	Identify academic documents from the literature which are related to her/his areas of interest	2	2	1	1		2	1					3
		CO 2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest	3	3	2	3		2	1					3
CSQ413	SEMINAR	CO 3	Prepare a presentation about an academic document	3	2			3			1		2		3
		CO 4	Give a presentation about an academic document	3				2			1		3		2
		CO 5	Prepare a technical report	3	3	3	3	2	2		2		3		3
CSD415	PROJECT PHASE I	CO 1	Model and solve real world problems by applying knowledge across domains	2	2	2	1	2	2	2	1	1	1	1	2
		CO 2	Develop products, processes or technologies for sustainable and socially relevant applications	2	2	2		1	3	3	1	1		1	1
		CO 3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks									3	2	2	1
		CO 4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms					2			3	2	2	3	2
		CO 5	Identify technology/research gaps and propose innovative/creative solutions					2			3	2	2	3	2
		CO 6	Organize and communicate technical and scientific findings effectively in written and oral forms					2			2	2	3	1	1
		CO 1	Implement lexical analyzer using the tool LEX.	3	3	3	2	3			2		1		3
		CO 2	Implement Syntax analyzer using the tool YACC.	3	3	3	2	3			2		1		3
CSL411	COMPILER LAB	CO 3	Design NFA and DFA for a problem and write programs to perform operations on it.	3	3	3	2				2		1		3
		CO4	Design and Implement Top-Down parsers.	3	3	3	2				2		1		3
		CO5	Design and Implement Bottom-Up parsers.	3	3	3	2				2		1		3
		CO6	Implement intermediate code for expressions.	3	3	3	2				2		1		3

Course code	Course Name		Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
		CO 1	Summarize various aspects of distributed computation model and logical time.	2	2	2									
		CO 2	Illustrate election algorithm, global snapshot algorithm and termination detection algorithm.	2	2	3									
CST 402	DISTRIBUTE COMPUTING	CO 3	Compare token based, non-token based and quorum based mutual exclusion algorithms.	2	3	2	2								
		CO 4	Recognize the significance of deadlock detection and shared memory in distributed systems.	2	2	2									
		CO 5	Explain the concepts of failure recovery and consensus.	2	3	3									
		CO 6	Illustrate distributed file system architectures.	2	2	2									
		CO 1	Describe the characteristics of different hardware/software components of an embedded system.	3	1	2									2
		CO 2	Map the design of an embedded system to an appropriate computational model.	3	2	1	1								2
CST 464	EMBEDDED SYSTEMS	CO 3	Recommend appropriate process synchronization / communication / scheduling mechanisms for specific system scenarios.	3	2	2	2								2
		CO 4	Describe the role of real-time operating systems in embedded devices.	3	1	1									2
		CO5	Make use of design strategies for developing real-world embedded systems.	2	2	3	2								2
		CO 1	Employ the key process of data mining and data warehousing concepts in application domains	2	3										2
		CO 2	Make use of appropriate preprocessing techniques to convert raw data into suitable format for practical data mining tasks	2	3	2	2	2							2
CST 466	DATA MINING	CO 3	Illustrate the use of classification and clustering algorithms in various application domains	2	3	2	2	2							2
		CO 4	Comprehend the use of association rule mining techniques.	2	3	2	2	2							2
		CO5	Explain advanced data mining concepts and their applications in emerging domains	2	3										2
		CO 1	Explain the various mobile computing applications, services, design considerations and architectures	2	1										1
		CO 2	Describe the various technology trends for next generation cellular wireless networks and use the spreading concept on data transmission	2	1	1	1								1
OOT 476	MOBILE	CO 3	Summarize the architecture of various wireless LAN technologies	2	1	1									1
CST 476	COMPUTING	CO 4	Identify the functionalities of mobile network layer and transport layer	2	1	1		1							1
		CO5	Explain the features of Wireless Application Protocol	2	1	1									1
		CO6	Interpret the security issues in mobile computing and next generation technologies	2	1	1									1

	COMPREHENSIV	CO 1	The objective of this Course viva is to ensure the basic knowledge of each student in the most fundamental core courses in the curriculum.	3	1	3		1	3	1	2	3	2		2
CST 404	E COURSE VIVA	CO 2	The viva voce shall be conducted based on the core subjects studied from third to eighth semester	3	3	3	1		3	1		2		2	2
	VIVA	CO 3	helps the learner to become competent in placement tests and other competitive examinations.	3	2	3	2	2	3	1	2	2	2	1	2
		CO 1	Model and solve real world problems by applying knowledge across domains	2	2	2	1	2	2	2	1	1	1	1	2
		CO 2	Develop products, processes or technologies for sustainable and socially relevant applications	2	2	2		1	3	3	1	1		1	1
CSD 416	PROJECT PHASE	CO 3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks									3	2	2	1
		CO 4	Plan and execute tasks utilizing available resources within timelines,					2			3	2	2	3	2
		CO 5	Identify technology/research gaps and propose innovative/creative solutions	2	3	3	1	2							
		CO 6	Organize and communicate technical and scientific findings effectively in written and oral forms					2			2	2	3	1	1