







		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
PHL 120	ENGINEERING PHYSICS LAB	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
		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 experiments and by interpreting the results					3			1	2			1
CYL 120	ENGINEERING CHEMISTRY LAB	CO 1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses	3				2							
		CO 2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs	3				3							
		CO 3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds	3				3							
		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							
ESL 120	CIVIL & MECHANICAL WORKSHOP	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		
		CO 3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work	1				1	1		2	2	2	1	
		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 measurements	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 workshop trades	2											
		CO 8	Apply appropriate safety measures with respect to the mechanical workshop trades	2											
		CO 1	Demonstrate safety measures against electric shocks					3							1

ESL 130	ELECTRICAL & ELECTRONICS WORKSHOP	CO 2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols	2									1				
		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	
		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

### SEMESTER - 3

Course code	Course Name	Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
MAT203	DISCRETE MATHEMATICAL STRUCTURES	CO 1	Check the validity of predicates in Propositional and Quantified Propositional Logic using truth tables, deductive reasoning and inference theory on 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								
		CO 3	Classify binary relations into various types and apply these types of binary relations and use them in the application of Partially Ordered Sets and Lattices in Computer Science	2	2	2	2		1						1
		CO 5	Explain Generating Functions and solve First Order and Second Order Linear Recurrence Relations with Constant Coefficients	2	2	2	2		1						1
		CO 6	Illustrate the abstract algebraic systems - Semigroups, Monoids, Groups, Homomorphism and Isomorphism of Monoids and Groups	2	2	2	2		1						1
CST201	DATA STRUCTURES	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	
		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	



CSL201	DATA STRUCTURES LAB	CO 1	Design and implement time/space efficient program using arrays to provide necessary functionalities meeting a given set of user requirements	3	2	3	3		2		1		1		2	
		CO 2	Design and Implement 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
		CO 3	Design and implement an efficient data structure to represent given data	2	2	3	2				1		1			2
		CO 4	Design and implement a time/space efficient program to convert an arithmetic expression from one notation to another	2	2	3	2				1		1			2
		CO 5	Design and implement a program using linked lists to simulate Memory Allocation and Garbage Collection	1	1	2					1		1			1
		CO 6	Design and implement time/space efficient program using trees and graphs to provide necessary functionalities meeting a given set of user requirements	1	1	2					1		1			1
CSL 203	OBJECT ORIENTED PROGRAMMING USING JAVA (IN JAVA)	CO 1	Implement the Object Oriented concepts - constructors, inheritance, method overloading & overriding and polymorphism in Java .	3	3	3					2				2	
		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	
		CO 4	Implement application programs in Java using multithreading and database connectivity	3	3	3					2				2	
		CO 5	Implement Graphical User Interface based application programs by utilizing event handling features and Swing in Java	3	3	3					2				2	

#### SEMESTER - 4

Course code	Course Name	Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
MAT 216	MATHEMATICAL FOUNDATION FOR MACHINE LEARNING	CO 1	Make use of the concepts, rules and results about linear equations, matrix algebra, vector spaces, eigen values & orthogonality & diagonalization to solve computational problems	3	3	3	3		2					2	
		CO 2	Perform calculus operations on functions of several variables and matrices including partial derivatives and gradients	3	3	3	3		2						2
		CO 3	Utilize the concepts, rules and results about probability, random variables, additive & multiplications rules, conditional probability distributions and Bayes' theorem to find solutions of computational problems	3	3	3	3		2						2
		CO 4	Train machine learning models using unconstrained and constrained optimization methods.	3	3	3	3		2						2
		CO 1	Recognize and express the relevance of basic components, I/O organization and pipelining schemes in a digital computer	1	1	1	1							1	

CST 202	COMPUTER ORGANIZATION AND ARCHITECTURE	CO 2	Explain the types of memory systems and mapping functions used in memory systems	2	2	2	2						2		2		
		CO 3	Demonstrate the control signals required for the execution of a given instruction	2	2	2	2							2		2	
		CO 4	Illustrate the design of Arithmetic Logic Unit and explain the usage of registers in it	2	2	2	2								2		2
		CO 5	Explain the implementation aspects of arithmetic algorithms in a digital computer	2	2	2									2		1
		CO 6	Develop the control logic for a given arithmetic problem	2	2	2	2										2
CST 204	DATABASE MANAGEMANT SYSTEM	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
		CO 3	Model and design solutions for efficiently representing and querying data using relational model	2	2	2	2										1
		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 systems	2	2	2									2		1
		CO 6	Explain various types of NoSQL databases	1	2	2		3							2		1
CST206	OPERATING SYSTEMS	CO 1	Explain the relevance, structure and functions of Operating Systems in computing devices	2	2	2						2		2		2	
		CO 2	Illustrate the concepts of process management and process scheduling mechanisms employed in Operating Systems.	2	2	2						2		2		2	
		CO 3	Explain process synchronization in Operating Systems and illustrate process synchronization mechanisms using Mutex Locks, Semaphores and Monitors	2	2	2	2					2		2		2	
		CO 4	Explain any one method for detection, prevention, avoidance and recovery for managing deadlocks in Operating Systems	2	2	1	2					2		2		2	
		CO 5	Explain the memory management algorithms in Operating Systems	2	2	2	2					2		2		2	
		CO 6	Explain the security aspects and algorithms for file and storage management in Operating Systems	2	2	1	2					2		2		2	
HUT 200	Professional Ethics	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		
		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	Explain the background of the present constitution of India and features							2	2	2		2			



		CO 3	Design a Pushdown Automaton and a Context-Free Grammar for a given context-free language.	3	2	2	2								3	3		
		CO 4	Design Turing machines as language acceptors or transducers.	3	2	2	2								3	3		
		CO 5	Explain the notion of decidability.	3	2	3	2								3	3		
CST303	COMPUTER NETWORKS	CO 1	Explain the features of computer networks, protocols, and network design models	3	2										3	3		
		CO 2	Describe the fundamental characteristics of the physical layer and identify the usage in network communication	3	3	2										3	3	
		CO 3	Explain the design issues of data link layer, link layer protocols, bridges and switches	3	2	1										3	3	
		CO 4	Illustrate wired LAN protocols (IEEE 802.3) and wireless LAN protocols (IEEE 802.11)	3	2	1										2	3	
		CO5	Select appropriate routing algorithms, congestion control techniques, and Quality of Service requirements for a network	3	2	1	1									3	3	
		CO 6	Illustrate the functions and protocols of the network layer, transport layer, and application layer in inter-networking	3	2	1				2						3	3	
AMT 305	INTRODUCTION TO MACHINE LEARNING	CO 1	Illustrate Machine Learning concepts and basics of supervised learning concepts.	3	3	3	1									1		
		CO 2	Describe dimensionality reduction techniques and supervised learning concepts	1	1	3	1	1									1	
		CO 3	Solve real life problems using appropriate machine learning models and evaluate the performance measures and Illustrate the concepts of Multilayer neural network	1	1	3	3											1
		CO 4	Illustrate basics of parameter estimation models and the working of classifier SVM classifier model	1	2	1	1											1
		CO 5	Describe unsupervised learning concepts	2	1	1	1											1
AIT 307	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	CO 1	Explain the fundamental concepts of intelligent systems and their architecture.	2														
		CO 2	Illustrate uninformed and informed search techniques for problem solving in intelligent systems.	2	2												1	
		CO 3	Solve Constraint Satisfaction Problems using search techniques.	2	2	2	2	2									1	
		CO 4	Represent AI domain knowledge using logic systems and use inference techniques for reasoning in intelligent systems.	2	2	2	2	2									1	
		CO 5	Illustrate different types of learning techniques used in intelligent systems	2	2	2				2								1
CST 309	MANAGEMENT OF SOFTWARE SYSTEM	CO 1	Demonstrate Traditional and Agile Software Development approaches	3	3	3	3			3					3			
		CO 2	Prepare Software Requirement Specification and Software Design for a given problem.	3	3	3	3			3					3			
		CO 3	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			

		CO 4	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			
		CO 5	Utilize SQA practices, Process Improvement techniques and Technology advancements in cloud based software models and containers & microservices	3	3	3	3		3							
MCN 301	DISASTER MANAGEMENT	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		2				2				2		2	
		CO 2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment	2	3	2		2	2	3				3		2
		CO 3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk	2	3	2	2	2	2	3				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	3	3	3		2	2	3						2
		CO 5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions	3	3			2	2	3						2
		CO 6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level	3					2	3	3					2
AML 311	PYTHON AND MACHINE LEARNING LAB	CO 1	Develop applications in Python programming	3	3	3									1	
		CO 2	Implement machine learning algorithms using packages and libraries in Python for various applications	3	3	3									1	
		CO 3	Implement python programs for supervised learning methods through Neural network, Regression and classification	3	3	3									1	
		CO 4	Implement clustering algorithms	3	3	3	3								1	
		CO 5	Apply dimensionality reduction as a dataset preprocessing step	3	3	3	3					1				1
AIL333	AI ALGORITHMS LAB	CO 1	State the basics of learning problems with hypothesis and version spaces	3	3	3	3	3				1			1	
		CO 2	Demonstrate real-world problems as state space problems, optimization problems or constraint	3	3	3	3	3				1			1	
		CO 3	Simulate given problem scenario and analyze its performance.	3	3	3	3	3				1			1	
		CO 4	Develop programming solutions for given problem scenario.	3	3	3	3	3	3			1			1	
		CO 5	Design and develop an expert system by using appropriate tools and techniques.	3	3	3	3	3				1			1	

## SEMESTER - 6

Course code	Course Name	Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
		CO 1	Summarize basic concepts and learning methods for NLP	3	3	3	3							1
		CO 2	Demonstrate the relevance of preprocessing methods on text data	3	3	3	3							1



		CO 4	Examine the overall performance of the economy, and the regulation of economicfluctuations 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		
AIT 353	ARTIFICIAL NEURAL NETWORKS TECHNIQUES	CO 1	Summarize the basic concepts and the learning rules of ANN	3	2	2									3	
		CO 2	Utilize the fundamental learning algorithms namely, Mc-Culloch Pitts, Hebb Perceptron and Adaline to solve real world problems	3	2	2	2	2								3
		CO 3	Implement Back propagation learning algorithm, Generic Radial Basis Function network.	3	2	2	2	2								3
		CO4	Demonstrate Self Organizing Maps and Adaptive Resonance Theory	3	0	0	2	2								3
		CO 5	Implement training algorithms for pattern association	3	2	3	2	2								3
AML332	NATURAL LANGUAGE PROCESSING LAB	CO 1	Apply the concept of natural language processing (NLP) using Natural Language Toolkit (NLTK)	3	3	3									1	
		CO 2	Build text corpora with tokenization, Stemming, Lemmatization and apply visualization techniques	3	3	3										1
		CO 3	Evaluate the classifiers and choose the best classifier	3	3	3										1
		CO 4	Create Artificial Intelligence applications for text data	3	3	3										1
CSD 334	MINI PROJECT	CO 1	Identify technically and economically feasible problems	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 processes	3	2	3	2	3	2	3		3	3	2	2	
		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	

## SEMESTER - 7

Course code	Course Name	Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
AIT401	FOUNDATIONS OF DEEP LEARNING	CO 1	Illustrate the basic concepts of neural networks, deep learning and its practical issues	3	3	2	2							3	
		CO 2	Outline the standard regularization and optimization techniques for the effective training of deep neural networks	3	2	2	3								3
		CO 3	Build convolutional Neural Network (CNN) models for different use cases.	3	3	3	2	2							3

		CO 4	Apply the concepts of Recurrent Neural Network (RNN), Long Short Term Memory(LSTM), Gated Recurrent Unit (GRU)	3	3	2	1	2											3			
		CO 5	Explain the concepts of auto encoder, generative models	3	2	1	2												3			
MCN 401	INDUSTRIAL SAFETY ENGINEERING	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		
		CO 3	Explain different issues in construction industries.	2	2	2			1	1	1	1	1	1	1	1					1	
		CO 4	Describe various hazards associated with different machines and mechanical material handling	2	2	2			1	1	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	1	1	1				1	
CST 423	CLOUD COMPUTING	CO 1	Explain the various cloud computing models and services.	2																2		
		CO 2	Demonstrate the significance of implementing virtualization techniques.	2	2	2															2	
		CO 3	Explain different cloud enabling technologies and compare private cloud platforms	2																		2
		CO 4	Apply appropriate cloud programming methods to solve big data problems.	2	2	2	2	2														2
		CO5	Describe the need for security mechanisms in cloud	2	2																	2
		CO 6	Compare the different popular cloud computing platforms	2					2													2
CET445	NATURAL DISASTER AND MITIGATION	CO 1	Explain interaction between subsystems of earth that give rise to hazards and their potential for disasters	2	1			2	1	2	3	1					1	1		3		
		CO 2	Explain the evolving concepts and thoughts of management of hazards and disasters	2	1			2	1	2	3	1						1	1		3	
		CO 3	Analyse the causes behind natural disasters and evaluate their magnitude and impacts	1	2	2	3	3	3	2	2	2	2	2	2	2				1	3	
		CO 4	Create management plans for hazards and disasters, and understand the roles of agencies involved.	2	1	3	2	3	2	3	2	2	2	2	2	2	1			3	3	
		CO5	Explain the concept of sustainable development and EIA and their role in mitigating disasters	2	2	3	2	1	3	3	2	1	2	2	2	2	2					3
ECQ413	SEMINAR	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	
		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						3
		CO 5	Prepare a technical report	3	3	3	3	2	2			2				3						3



CST444	SOFT COMPUTING	CO 2	Solve practical problems using neural networks	3	2	2	2											3			
		CO 3	Illustrate the operations, models and applications of fuzzy logic	3	2	2	2												3		
		CO 4	Illustrate the concepts of genetic algorithm	3	2	2	2												3		
		CO 5	Describe the concepts of multi objective optimization techniques models and the need for using hybrid soft computing approaches	3	2	3														3	
CST466	DATA MINING	CO 1	Employ the key process of data mining and data warehousing concepts in application domains	3	1														1		
		CO 2	Make use of appropriate preprocessing techniques to convert raw data into suitable format for practical data mining tasks	3	2	1	1	2												1	
		CO 3	Illustrate the use of classification and clustering algorithms in various application domains	3	2	2	2	2												1	
		CO 4	Comprehend the use of association rule mining techniques	3	2	2	2	1												1	
		CO 5	Explain advanced data mining concepts and their applications in emerging domains	3	1																1
CST 438	IMAGE PROCESSING TECHNIQUES	CO 1	Explain the concepts of image formation and the basis of digital image processing.	3	3														3		
		CO 2	Demonstrate the role of image transforms in representing, highlighting, and modifying image features	3	3			3												3	
		CO 3	Solve image enhancement problems using spatial and frequency domain techniques.	3	3	3														3	
		CO 4	Make use of the concept of image restoration and image segmentation techniques in real-world	3	3	3	3	3	3											3	
		CO 5	Interpret morphological operations, image representation, and description techniques.	3	3																3
ECT404	COMPREHENSIVE COURSE VIVA	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		
		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	
		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	2	1					2	
ECD416	PROJECT PHASE II	CO 1	Model and solve real world problems by applying knowledge across domains	2	2	2	1	2	2	2	1	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				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	3	1	2													1
		CO 6	Organize and communicate technical and scientific findings effectively in written and oral forms					2				2	2	3	1						1