

PROGRAMME SPECIFIC OUTCOMES, PROGRAMME OUTCOMES AND COURSE OUTCOMES

PG DEPARTMENT OF COMPUTER SCIENCE

B.Sc (COMPUTER SCIENCE) - SKILL-BASED COURSES, NON-MAJOR ELECTIVE COURSES,

EXTRA-CREDIT COURSES & VALUE-ADDED COURSES

PSO, PO & CO STATEMENTS / 2023

PSOs	PROGRAMME SPECIFIC OUTCOMES
PSO1	Think in a critical and logical based manner
PSO2	Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or statistics and real time application related sciences.
PSO3	Know when there is a need for information, to be able to identify, locate, evaluate and effectively use that information for the issue or problem at hand.
PSO4	Understand, formulate, develop programming model with logical approaches to a Address issues arising in social science, business and other contexts.
PSO5	Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics.
PSO6	Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in Computer Science or Applications or Information Technology and its allied areas on multiple disciplines linked with Computer Science.
PSO7	Equip with Computer science technical ability, problem solving skills, creative talent and power of communication necessary for various forms of employment.
PSO8	Develop a range of generic skills helpful in employment, internships& societal activities.
PSO9	Get adequate exposure to global and local concerns that provides platform for further exploration into multi-dimensional aspects of computing

	sciences.	
B.Sc (COMPUTER SCIENCE)		
B.Sc (COMPUTER SCIENCE) / PROGRAMMES OUTCOMES		
POs	Description of POs	
PO1	Knowledge	
PO2	Problem Analysis	
PO3	Design / Development of Solutions	
PO4	Conduct investigations of complex problems	
PO5	Modern tool usage	
PO6	Applying to society	
PO7	Decision Making Skill	
PO8	Communication Skill	
PO9	Employability Skill	
PO10	Entrepreneurial Skill	
B.Sc (COMPUTER SCIENCE)/ COURSE OUTCOMES		
	Description of COs	Bloom's Taxonomy / Cognitive Domain
Core-I Python Programming		
CO1.	Learn the basics of python, Do simple programs on python, Learn how to use an array.	PO1, PO2, PO3, PO4, PO5, PO6
CO2.	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	PO1, PO2, PO3, PO4, PO5, PO6
CO3.	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	PO1, PO2, PO3, PO4, PO5, PO6

CO4.	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	PO1, PO2, PO3, PO4, PO5, PO6
CO5.	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	PO1, PO2, PO3, PO4, PO5, PO6
Core-II Python Programming Lab		
CO1.	Demonstrate the understanding of syntax and semantics of PYTHON language	PO1,PO4,PO5
CO2.	Identify the problem and solve using PYTHON programming techniques.	PO1,PO4,PO6
CO3.	Identify suitable programming constructs for problem solving.	PO1,PO3,PO6
CO4.	Analyze various concepts of PYTHON language to solve the problem in an efficient way.	PO3,PO4
CO5.	Develop a PYTHON program for a given problem and test for its correctness.	PO1,PO5,PO6
Elective-I Discrete Mathematics – I		
CO1.	To understand the mathematical concepts like set theory, logics, number theory, combinatory and relations.	PO1, PO2, PO3, PO4, PO5, PO6
CO2.	To understand different mathematical logics and functions	PO1, PO2, PO3, PO4, PO5, PO6
CO3.	To Understanding the different form of number theory	PO1, PO2, PO3, PO4, PO5, PO6
CO4.	To gain knowledge on set theory	PO1, PO2, PO3,PO4,PO5, PO6
CO5.	Able to understand Relations and its applications	PO1, PO2, PO3,PO4,PO5, PO6
Elective-I Introduction to Linear Algebra		
CO1.	The concepts of linear algebra are crucial for understanding the theory behind machine learning, especially for deep learning.	PO1,PO2,PO3, PO4, PO5,PO6
CO2.	Prove statements of an algebraic nature concerning linear transformations	PO1,PO2,PO3, PO4, PO5,PO6
CO3.	Calculate eigen values and their corresponding eigen spaces	PO1,PO2,PO3,PO4,PO5, PO6
CO4.	Determine Rank of a matrix	PO1,PO2,PO3,PO4,PO5, PO6
CO5.	Understand algebraic and geometric representations	PO1,PO2,PO3,PO4,PO5, PO6
SEC1 / NME Fundamentals of Information Technology		

Elective-III		Numerical Methods
CO1.	Know how to solve various problems on numerical methods	PO1,PO2, PO3,PO4, PO5, PO6
CO2.	Use approximation to solve problems	PO1,PO2,PO3,PO4, PO5, PO6
CO3.	Differentiation and integration concept are applied	PO1,PO2,PO3, PO4, PO5, PO6
CO4.	Apply , direct methods for solving linear systems	PO1,PO2,PO3,PO4, PO5, PO6
CO5.	Numerical solution of ordinary differential equations	PO1,PO2,PO3,PO4, PO5, PO6
SEC4		Enterprise Resource Planning
CO1.	Understand the basic concepts of ERP.	PO1, PO2, PO6
CO2.	Identify different technologies used in ERP	PO2, PO3, PO4
CO3.	Understand and apply the concepts of ERP Manufacturing Perspective and ERP Modules	PO1, PO3, PO6
CO4.	Discuss the benefits of ERP	PO2, PO6
CO5.	Apply different tools used in ERP	PO1, PO3, PO5
SEC5		WEB DESIGNING
CO1.	Develop working knowledge of HTML	PO1, PO3, PO6, PO8
CO2.	Ability to Develop and publish Web pages using Hypertext Markup Language (HTML).	PO1,PO2,PO3,PO6
CO3.	Ability to optimize page styles and layout with Cascading Style Sheets (CSS).	PO3, PO5
CO4.	Ability to develop a java script	PO1, PO2, PO3, PO7
CO5.	An ability to develop web application using Ajax.	P02, PO6, PO7
Core-VII		Java Programming
CO1.	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1, PO2, PO6
CO2.	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO2, PO3, PO8
CO3.	Implement multi-threading and I/O Streams of Core Java	PO1, PO3, PO5

	construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	
CO4.	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.	PO4, PO5, PO6
CO5.	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions	PO3, PO5
Core-XI Database Management System lab		
CO1.	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.	PO1
CO2.	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.	PO1, PO2
CO3.	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	PO4, PO6
CO4.	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.	PO4, PO5, PO6
CO5.	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions	PO3, PO4
Core-XII .Net Programming		
CO1.	Develop working knowledge of C# programming constructs and the .NET Framework	PO1, PO2, PO6
CO2.	To develop a software to solve real-world problems using ASP.NET	PO2, PO3, PO5
CO3.	To Work On Various Controls Files	PO1, PO3, PO6
CO4.	To create a web application using MicrosoftADO.NET.	PO2, PO6
CO5.	To develop web applications using XML	PO1, PO3, PO6

Elective-V		Image Processing
CO1.	Understand the fundamental concepts of digital image processing.	PO1
CO2.	Understand various 2D Image transformations	PO1, PO2
CO3.	Understand image enhancement processing techniques and filters	PO4, PO6
CO4.	Understand the classification of Image segmentation techniques	PO4, PO5, PO6
CO5.	Understand various image compression techniques	PO3, PO5
Elective-V		Artificial Intelligence
CO1.	Understand the various concepts of AI Techniques.	PO1
CO2.	Understand various Search Algorithm in AI.	PO1, PO2
CO3.	Understand probabilistic reasoning and models in AI.	PO4, PO6
CO4.	Understand Markov Decision Process.	PO4, PO5, PO6
CO5.	Understand various type of Reinforcement learning Techniques.	PO3, PO4
Elective-VI		Internet of Things and its applications
CO1.	Work with big data tools and its analysis techniques.	PO1
CO2.	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
CO3.	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6
CO4.	Perform analytics on data streams.	PO4, PO5, PO6
CO5.	Learn No SQL databases and management.	PO3, PO5
Elective-VI		Introduction to Data Science
CO1.	Understand the basics in Data Science and Big data.	PO1
CO2.	Understand overview and building process in Data Science.	PO1, PO2
CO3.	Understand various Algorithms in Data Science.	PO3, PO6

Elective-VIII		Robotics and its Applications	
CO1.	Describe the different physical forms of robot architectures.	PO1	
CO2.	Kinematically model simple manipulator and mobile robots.	PO1, PO2	
CO3.	Mathematically describe a kinematic robot system	PO4, PO6	
CO4.	Analyze manipulation and navigation problems using knowledge of coordinate frames, kinematics, optimization, control, and uncertainty.	PO4, PO5, PO6	
CO5.	Program robotics algorithms related to kinematics, control, optimization, and uncertainty.	PO3, PO4	
SEC8		Quantitative Aptitude	
CO1.	understand the concepts, application and the problems of numbers	PO1	
CO2.	To have basic knowledge and understanding about percentage, profit & loss related processing.	PO1, PO2	
CO3.	To understand the concepts of time and work	PO4, PO6	
CO4.	Speaks about the concepts of probability, discount	PO4, PO5	
CO5.	Understanding the concept of problem solving involved in stocks & shares, graphs	PO3, PO6	
EXTRA CREDIT PAPER			
Semester-I		UNDERSTANDING INTERNET	
CO1.	Knows the basic concept in internet. Concept of mass medium and world wide web.	PO1,PO2, PO3,PO4, PO5, PO6	
CO2.	Knows the concept of internet as a technology.	PO1,PO2,PO3,PO4, PO5, PO6	
CO3.	Understand the concept of infotainment and classification based on content and style	PO1,PO2,PO3, PO4, PO5, PO6	
CO4.	Can be able to know about Demographic and psychographic description of internet.	PO1,PO2,PO3,PO4, PO5, PO6	
CO5.	Understand the concept of cyber crime and future possibilities	PO1,PO2,PO3,PO4, PO5, PO6	
Semester-III		TALLY LAB	
CO1.	Get idea about creation and alteration of company profile	PO1,PO2, PO3,PO4, PO5, PO6	

CO2.	Understand and apply various accounting voucher entries	PO1,PO2, PO3,PO4, PO5, PO6
CO3.	Acquire the knowledge in bank reconciliation statement preparation and stock summary.	PO1,PO2, PO3, PO4, PO5, PO6
CO4.	Designed to impart knowledge regarding concepts of Financial Accounting.	PO1,PO2, PO3,PO4, PO5, PO6
CO5.	Required skills and can also be employed as Tally data entry operator.	PO1,PO2, PO3,PO4, PO5, PO6
Semester-V IPR, PLAGIARISM, COPYRIGHTS AND PATENTS		
CO1.	Understand and use the basic concepts of Intellectual property Rights	PO1,PO2, PO3,PO4, PO5, PO6
CO2.	Examine the Concepts of Intellectual property Rights such as Plagiarism, Copyrights, Infringement, Patents and Licensing	PO1,PO2, PO3,PO4, PO5, PO6
CO3.	To identify the significance of practice and procedure of Patents.	PO1,PO2, PO3, PO4, PO5, PO6
CO4.	Demonstrate the procedure obtaining copyrights, Trademarks and Industrial Design.	PO1,PO2,PO3,PO4, PO5, PO6
CO5.	Evaluate to enable the students to keep their IP rights alive	PO1,PO2,PO3,PO4, PO5, PO6
VALUE-ADDED COURSES		
Semester-II HARDWARE AND TROUBLESHOOTING		
CO1.	Obtaining knowledge of troubleshoot the hardware components of a computer.	PO1,PO2, PO3,PO4, PO5, PO6
CO2.	Comprehending the troubleshooting techniques for storage devices, input and output devices.	PO1,PO2, PO3,PO4, PO5, PO6
CO3.	Applying the troubleshooting techniques for hardware failures.	PO1,PO2, PO3, PO4, PO5, PO6
CO4.	Examining the troubleshooting techniques in Network, Printers and Mother board.	PO1,PO2,

		PO3,PO4, PO5, PO6
CO5.	Assembling a new system with standard hardware component	PO1,PO2, PO3,PO4, PO5, PO6
Semester-IV APPLICATION DEVELOPMENT IN PROGRAMMING LANGUAGES		
CO1.	Acquiring the knowledge of Application Development in Programming Languages	PO1,PO2, PO3,PO4, PO5, PO6
CO2.	Understanding the concept of interpreter and Compiler	PO1,PO2,PO3,PO4, PO5, PO6
CO3.	Illustrating categories of programming languages	PO1,PO2,PO3, PO4, PO5, PO6
CO4.	Correlating various programming languages used in popular website	PO1,PO2,PO3,PO4, PO5, PO6
CO5.	Developing simple applications in structured and object oriented Programming Languages.	PO1,PO2,PO3,PO4, PO5, PO6
Semester-VI COMPUTER FOR DIGITAL ERA		
CO1.	Get an idea about computer and apply the computing technology in their day to day life.	PO1,PO2, PO3,PO4, PO5, PO6
CO2.	Acquire the knowledge about digital India initiatives to their surroundings.	PO1,PO2,PO3,PO4, PO5, PO6
CO3.	Enhancing the digital skill-set required in workplace.	PO1,PO2,PO3, PO4, PO5, PO6
CO4.	To understand about the E- learning and Security issues.	PO1,PO2,PO3,PO4, PO5, PO6
CO5.	To create awareness about MOOC, SWAYAM, NPTEL courses.	PO1,PO2,PO3,PO4, PO5, PO6

**PROGRAMME SPECIFIC OUTCOMES, PROGRAMME OUTCOMES AND
COURSE OUTCOMES**

**PG DEPARTMENT OF COMPUTER SCIENCE M.Sc(COMPUTER SCIENCE)COURSE
PSO, PO AND CO STATEMENTS / 2023**

M.Sc (COMPUTER SCIENCE)

M.Sc (COMPUTER SCIENCE)/ PROGRAMMES SPECIFIC OUTCOMES

PSOs	PROGRAMME SPECIFIC OUTCOMES
PSO1	Placement To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.
PSO2	Entrepreneur To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.
PSO3	Research and Development Design and implement HR systems and practices grounded in researches that comply with employment laws, leading the organization towards growth and development.
PSO4	Contribution to Business World To produce employable, ethical and innovative professionals to sustain in the dynamic business world.
PSO5	Contribution to the Society To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

M.Sc (COMPUTER SCIENCE)

M.Sc (COMPUTER SCIENCE)/ PROGRAMMES OUTCOMES

POs	Description of Pos
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PO1	problem Solving Skill Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.
PO2	Decision Making Skill Foster analytical and critical thinking abilities for data-based decision-making.
PO3	Ethical Value Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.
PO4	Communication Skill Ability to develop communication, managerial and interpersonal skills.
PO5	Individual and Team Leadership Skill Capability to lead themselves and the team to achieve organizational goals.
PO6	Employability Skill Inculcate contemporary business practices to enhance employability skills in the competitive environment.
PO7	Entrepreneurial Skill Equip with skills and competencies to become an entrepreneur.
PO8	Contribution to Society Succeed in career endeavors and contribute significantly to society.
PO9	Multicultural competence Possess knowledge of the values and beliefs of multiple cultures and global perspective.
PO10	Moral and ethical awareness/reasoning Ability to embrace moral/ethical values in conducting one's life.

M.Sc (COMPUTER SCIENCE)/**COURSE OUTCOMES**

	Description of COs	Bloom's Taxonomy / Cognitive Domain
Core-I ANALYSIS & DESIGN OF ALGORITHMS		
CO1.	Get knowledge about algorithms and determines their time complexity. Demonstrate specific search and sort algorithms using divide and conquer technique.	K1,K2
CO2.	Gain good understanding of Greedy method and its algorithm.	K2,K3
CO3.	Able to describe about graph using dynamic programming technique.	K3,K4
CO4.	Demonstrate the concept of backtracking & branch and bound technique.	K5,K6
CO5.	Explore the traversal and searching technique and apply it for trees and graphs.	K6
Core-II OBJECT ORIENTED ANALYSIS AND DESIGN & C++		
CO1.	Understand the concept of Object-Oriented development and modeling techniques	K1,K2
CO2.	Gain knowledge about the various steps performed during object design	K2,K3
CO3.	Abstract object-based views for generic software systems	K3
CO4.	Link OOAD with C++ language	K4,K5
CO5.	Apply the basic concept of OOPs and familiarize to write C++ program	K5,K6
Core-III PYTHON PROGRAMMING		
CO1.	Understand the basic concept soft Python Programming	K1,K2
CO2.	Understand File operations, Classes and Objects	K2,K3

CO3.	Acquire Object Oriented Skills in Python	K3,K4
CO4.	Develop web applications using Python	K5
CO5.	Develop Client Server Networking applications	K5,K6
Elective-I PYTHON PROGRAMMING LAB		
CO1.	Able to write programs in Python using OOPS concepts	K1,K2
CO2.	To understand the concepts of File operations and Modules in Python	K2,K3
CO3.	Implementation of lists, dictionaries, sets and tuples as programs	K3,K4
CO4.	To develop web applications using Python	K5,K6
CO5.	To Implement Error handling using Python	K5,K6
Elective-I		
CO1.	Design dynamic web pages using JavaScript, JQuery and Angular Java script	K1
CO2.	Develop Web pages using HTML, CSS and XML	K2
CO3.	Create web application using PHP and MySQL	K3, K4
CO4.	Develop interactive web pages using JQuery	K2,K3
CO5.	Design and Develop fully functional dynamic web applications	K5,K6
Elective-II ALGORITHM AND OOPS LAB		
CO1.	Understand the concepts of object oriented with respect to C++	K1,K2
CO2.	Able to understand and implement OOPS concepts	K3,K4
CO3.	Implementation of data structures like Stack, Queue, Tree, List using C++	K4,K5
CO4.	Application of the data structures for Sorting, Searching using different techniques.	K5,K6

CO5.	Analyzing the handling formatted input and output and unformatted	K4,K5
Elective-II WAP AND XML LAB		
CO1.	Understand the concepts of HTML	K1,K2
CO2.	Able to understand and implement Java Script.	K3,K4
CO3.	Implementation of various XML Files.	K4,K5
CO4.	Application of WAP and its Techniques.	K5,K6
CO5.	To build and consume web services	K5,K6
Core-IV DATA MINING AND WARE HOUSING		
CO1.	Understand the basic data mining techniques and algorithms	K1,K2
CO2.	Understand the Association rules, Clustering techniques and Data warehousing contents	K2,K3
CO3.	Compare and evaluate different data mining techniques like classification, prediction, Clustering and association rule mining	K4,K5
CO4.	Design data warehouse with dimensional modeling and apply OLAP operations	K5,K6
CO5.	Identify appropriate data mining algorithms to solve real world problems	K6
Core-V ADVANCED OPERATING SYSTEMS		
CO1.	Understand the design issues associated with operating systems	K1,K2
CO2.	Master various process management concepts including scheduling, deadlocks and distributed file systems	K3,K4
CO3.	Prepare Real Time Task Scheduling	K4,K5
CO4.	Analyze Operating Systems for Handheld Systems	K5
CO5.	Analyze Operating Systems like LINUX and Ios	K5,K6

Core-VI		ADVANCED JAVA PROGRAMMING
CO1.	Understand the advanced concepts of Java Programming	K1,K2
CO2.	Understand JDBC and RMI concepts	K2,K3
CO3.	Apply and analyze Java in Database	K3,K4
CO4.	Handle different event in java using the delegation event model, event listener and class	K5
CO5.	Design interactive applications using Java Servlet, JSP and JDBC	K5,K6
Elective-III		ARTIFICIAL INTELLIGENCE& MACHINE LEARNING
CO1.	Demonstrate AI problems and techniques	K1,K2
CO2.	Understand machine learning concepts	K2,K3
CO3.	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning	K3,K4
CO4.	Analyze the impact of machine learning on applications	K4,K5
CO5.	Analyze and design a real world problem for implementation and understand the dynamic behavior of a system	K5,K6
Elective-III		MOBILE COMPUTING
CO1.	Understand the concept of communication medium and multiplexing in telephone network	K1,K2
CO2.	Comprehend the routing mechanism and frequency allocation in GSM	K2,K3
CO3.	Deploy the GPRS concept for packet data transfer in mobile by using GPRS	K3,K4
CO4.	Acquire the knowledge on WAP, CDMA, 3G network and spectrum techniques in wireless network	K4,K5
CO5.	contribute to the diagnostics, troubleshooting, documenting and monitoring of technical problems	K5,K6

CO1.	Understand the fundamentals of Digital Image Processing	K1,K2
CO2.	Understand the mathematical foundations for digital image representation, image acquisition, image transformation, and image enhancement	K2,K3
CO3.	Apply, Design and Implement and get solutions for digital image processing problems	K3,K4
CO4.	Apply the concepts of filtering and segmentation for digital image retrieval	K4,K5
CO5.	Explore the concepts of Multi-resolution process and recognize the objects in an efficient manner	K5,K6
Core-VIII CLOUDCOMPUTING		
CO1.	Understand the concepts of Cloud and its services	K1,K2
CO2.	Collaborate Cloud for Event & Project Management	K3,K4
CO3.	Analyze on cloud in–Word Processing, Spread Sheets, Mail ,Calendar, Database	K4,K5
CO4.	Analyze cloud in social networks	K5,K6
CO5.	Explore cloud storage and sharing	K6
Core-IX NETWORK SECURITY AND CRYPTOGRAPHY		
CO1.	Understand the process of the cryptographic algorithms	K1,K2
CO2.	Compareandapplydifferentencryptionanddecryptiontechniques tosolveproblems related to confidentiality and authentication	K2,K3
CO3.	Applyandanalyzeappropriatesecuritytechniques tosolvenetworksecurity problem	K3,K4
CO4.	Explore suitable cryptographic algorithms	K4,K5
CO5.	Analyzedifferentdigitalsignaturealgorithmstoachieveauthenticationand design secure applications	K5,K6
Core-X DATA SCIENCE & ANALYTICS		
CO1.	Understand the concept of data science and its techniques	K1,K2

CO2.	Implement & execute the real time application.	K3
CO3.	Analyze various testing methods.	K4
CO4.	Verify the expected results in real time applications.	K5
CO5.	Verify the expected results in real time applications	K5,K6
Elective-VI PRACTICAL: WEB APPLICATION DEVELOPMENT AND HOSTING		
CO1.	Understand & implement the basic HTML tags to create static web pages	K1,K2
CO2.	Capable of using hyperlinks, frames, images, tables, in a webpage	K2,K3
CO3.	Able to write dynamic web applications using HTML forms	K4,K5
CO4.	Must be able to write dynamic web applications in PHP & HTML tags using XAMPP.	K5
CO5.	Develop skill in client side web applications development technologies.	K5,K6
Elective-VI PRACTICAL : INTERNET OF THINGS LAB		
CO1.	Use IOT device for exchange of data.	K1,K2
CO2.	Use the programming skills of Raspberry PI	K3,K5
CO3.	Develop the cloud platform to analyze and upload sensor data	K4
CO4.	Design the applications using Arduino and Raspberry PI	K4,K5
CO5.	Use IOT device for exchange of data.	K1,K2
SEC/ Professional Competency Skill TRAINING FOR COMPETITIVE EXAMINATIONS		
CO1.	To gain knowledge on LCM and HCF and its related problems	K1,K2
CO2.	To get an idea of age, profit and loss related problem solving.	K2,K3
CO3.	Able to understand time series simple and compound interests	K4
CO4.	Understanding the problem related to probability, and series	K5,K6

CO5.	Able to understand graphs, charts	K6
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K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create

PROGRAMME SPECIFIC OUTCOMES, PROGRAMME OUTCOMES AND COURSE OUTCOMES

PG DEPARTMENT OF COMPUTER SCIENCE

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COURSES & VALUE-ADDED COURSES

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	for various forms of employment.
PSO8	Develop arrange of generic skills helpful in employment, internships & societal activities.
PSO9	Get adequate exposure to global and local concerns that provides platform for further exploration into multi-dimensional aspects of computing sciences. Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) can be carried out accordingly, assigning the appropriate level in the grids: (put tick mark in each row)
BCA	
BCA / PROGRAMMES OUTCOMES	
POs	Description of POs
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BCA/ COURSE OUTCOMES	

	Description of COs	Bloom's Taxonomy / Cognitive Domain
Core-I Python programming		
CO1.	Learn the basics of python, Do simple programs on python, Learn how to use an array.	PO1, PO2, PO3, PO4, PO5, PO6
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CO3.	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	PO1, PO2, PO3, PO4, PO5, PO6
CO4.	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	PO1, PO2, PO3, PO4, PO5, PO6
CO5.	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	PO1, PO2, PO3, PO4, PO5, PO6
Core-II Python Programming Lab		
CO1.	Demonstrate the understanding of syntax and semantics of PYTHON language	PO1, PO2, PO3, PO4, PO5, PO6
CO2.	Identify the problem and solve using PYTHON programming techniques.	PO1, PO2, PO3, PO4, PO5, PO6
CO3.	Identify suitable programming constructs for problem solving.	PO1, PO2, PO3, PO4, PO5, PO6
CO4.	Analyze various concepts of PYTHON language to solve the problem in an efficient way.	PO1, PO2, PO3, PO4, PO5, PO6
CO5.	Develop a PYTHON program for a given problem and test for its correctness.	PO1, PO2, PO3, PO4, PO5, PO6
Elective-I Discrete Mathematics – I		
CO1.	To understand the mathematical concepts like set theory, logics, number theory, combinatory and relations.	PO1, PO2, PO3, PO4, PO5, PO6
CO2.	To understand different mathematical logics and functions	PO1, PO2, PO3, PO4, PO5, PO6
CO3.	To understanding the different form of number theory	PO1, PO2, PO3, PO4, PO5, PO6

CO4.	To gain knowledge on set theory	PO1, PO2, PO3,PO4,PO5, PO6
CO5.	Able to understand Relations and its applications	PO1, PO2, PO3,PO4,PO5, PO6
Elective-I Introduction to Linear Algebra		
CO1.	The concepts of linear algebra are crucial for understanding the theory behind machine learning, especially for deep learning.	PO1,PO2,PO3, PO4, PO5,PO6
CO2.	Prove statements of an algebraic nature concerning linear transformations	PO1,PO2,PO3, PO4, PO5,PO6
CO3.	Calculate eigen values and their corresponding eigen spaces	PO1,PO2,PO3,PO4,PO5, PO6
CO4.	Determine Rank of a matrix	PO1,PO2,PO3,PO4,PO5, PO6
CO5.	Understand algebraic and geometric representations	PO1,PO2,PO3,PO4,PO5, PO6
SEC1 / NME Introduction to HTML		
CO1.	Knows the basic concept in HTML, Concept of resources in HTML	PO1, PO2, PO3, PO4, PO5, PO6
CO2.	Knows Design concept. Concept of Meta Data , Understand the concept of save the files.	PO1, PO2, PO3, PO4, PO5, PO6
CO3.	Understand the page formatting, Concept of list	PO1, PO2, PO3, PO4, PO5, PO6
CO4.	Creating Links, Know the concept of creating link to email address	PO1, PO2, PO3, PO4, PO5, PO6
CO5.	Concept of adding images, Understand the table creation.	PO1, PO2, PO3, PO4, PO5, PO6
Foundation Course (FC) Structured Programming in C		
CO1.	Remember the program structure of C with its syntax and semantics	PO1,PO3,PO5
CO2.	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2,PO3,PO6
CO3.	Apply the programming principles learnt in real-time problems	PO3,PO4,PO5
CO4.	Analyze the various methods of solving a problem and choose the best method	PO4,PO5,PO6

CO5.	Code, debug and test the programs with appropriate test cases	PO5,PO6
Core-III Object Oriented Programming Concepts Using C++		
CO1.	Remember the program structure of C with its syntax and semantics	PO1, PO2, PO3, PO4, PO5, PO6
CO2.	Understand the programming principles in C (datatypes, operators, branching and looping, arrays, functions, structures ,pointers and files)	PO1, PO2, PO3, PO4, PO5, PO6
CO3.	Apply the programming principles learn in real-time problems	PO1, PO2, PO3, PO4, PO5, PO6
CO4.	Analyze the various methods of solving a problem and choose the best method	PO1, PO2, PO3, PO4, PO5, PO6
CO5.	Code, debug and test the programs with appropriate test cases	PO1, PO2, PO3, PO4, PO5, PO6
Core-IV C++Programming lab		
CO1.	Remember the program structure of C with its syntax and semantics	PO1,PO6
CO2.	Understand the programming principles in C(data types, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
CO3.	Apply the programming principles learnt in real-time problems	PO4,PO7
CO4.	Analyze the various methods of solving a problem and choose the best method	PO6
CO5.	Code, debug and test the programs with appropriate test cases	PO7,PO8
Elective – II Statistical Methods and its Application-I		
CO1.	Summarize the concepts of statistical methods	PO1, PO2, PO3, PO4, PO5, PO6
CO2.	Analyses the different Statistical measures of data	PO1, PO2, PO3, PO4, PO5, PO6
CO3.	Derive the marginal and conditional distributions of random variables, translate real world problems into probability models	PO1, PO2, PO3, PO4, PO5, PO6
CO4.	To understanding the concepts of Probability of an event	PO1, PO2, PO3, PO4, PO5, PO6

CO2.	Gain knowledge on Creating Documents, spreadsheet and presentation.	PO1,PO2,PO3,PO6
CO3.	Learn the concepts of Database and implement the Query in Database.	PO3,PO5,PO7
CO4.	Demonstrate the understanding of different automation tools.	PO3,PO4,PO5,PO7
CO5.	Utilize the automation tools for documentation, calculation and presentation purpose.	PO4,PO6,PO7,PO8
Core-V Data Structure And Algorithms		
CO1.	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO6
CO2.	Understand basic data structures such as arrays, linked lists, stacks and queues	PO2
CO3.	Describe the hash function and concepts of collision and its resolution methods	PO2,PO4
CO4.	Solve problem involving graphs, trees and heaps	PO4,PO6
CO5.	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO5,PO6
Core-VI Data Structure and Algorithms Lab		
CO1.	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	PO1,PO4,PO5
CO2.	Understand basic data structures such as arrays, linked lists, stacks and queues	PO1,PO4,PO6
CO3.	Describe the hash function and concepts of collision and its resolution methods	PO1,PO3,PO6
CO4.	Solve problem involving graphs, trees and heaps	PO3,PO4
CO5.	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO1,PO5,PO6
Elective-III Internet of Things and its applications		
CO1.	Work with big data tools and its analysis techniques.	PO1
CO2.	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
CO3.	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6

CO4.	Discuss the benefits of ERP	PO2, PO6
CO5.	Apply different tools used in ERP	PO1, PO3, PO5
SEC5 Problem Solving Techniques		
CO1.	Understand the logic of problem and analyses implementation of algorithm and Top Down approach And concept of Recursion	PO1, PO2, PO6
CO2.	Able to understand the Sequence of Numbers and Series Fibonacci , Reversing ,Base Conversion.	PO2, PO3, PO4
CO3.	Able to do Algebraic operations	PO1, PO3, PO6
CO4.	Coverage of Arrays and its Logics	PO2, PO6
CO5.	Text Processing and Pattern Searching Approach	PO1, PO3, PO5
Core-VII Programming in Java		
CO1.	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1, PO2, PO6
CO2.	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO2, PO3, PO8
CO3.	Implement multi-threading and I/O Streams of Core Java	PO1, PO3, PO5
CO4.	Implement AWT and Event handling.	PO2, PO6
CO5.	Use Swing to create GUI.	PO1, PO3, PO6
Core-VIII Programming in Java Lab		
CO1.	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1
CO2.	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO1, PO2
CO3.	Implement multi-threading and I/O Streams of Core Java	PO4, PO6
CO4.	Implement AWT and Event handling.	PO4, PO5, PO6

CO5.	Use Swing to create GUI.	PO3, PO6
Elective-IV Resource Management Techniques		
CO1.	To understanding the concepts of Development of OR	PO1,PO2, PO3,PO4, PO5, PO6
CO2.	Develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transshipment problems	PO1,PO2,PO3,PO4, PO5, PO6
CO3.	Solve the problems of Simplex Method	PO1,PO2,PO3, PO4, PO5, PO6
CO4.	To study the Duality Theorems	PO1,PO2,PO3,PO4, PO5, PO6
CO5.	Finding initial basic feasible and optimal solution of the Transportation problems	PO1,PO2,PO3,PO4, PO5, PO6
Elective-IV Numerical Methods		
CO1.	Know how to solve various problems on numerical methods	PO1,PO2, PO3,PO4, PO5, PO6
CO2.	Use approximation to solve problems	PO1,PO2,PO3,PO4, PO5, PO6
CO3.	Differentiation and integration concept are applied	PO1,PO2,PO3, PO4, PO5, PO6
CO4.	Apply , direct methods for solving linear systems	PO1,PO2,PO3,PO4, PO5, PO6
CO5.	Numerical solution of ordinary differential equations	PO1,PO2,PO3,PO4, PO5, PO6
SEC6 Open Source Technologies		
CO1.	Acquire and understand the basic concepts in Java,application of OOPS concepts.	PO1,PO3,PO6,PO8
CO2.	Acquire knowledge about operators and decision-making statements.	PO1,PO2,PO3,PO6
CO3.	Identify the significance and application of Classes, arrays and interfaces and analyzing java arrays	PO3,PO5
CO4.	Understand about the applications of OOPS concepts and analyze overriding and packages through java programs.	PO1,PO2,PO3,PO7
CO5.	Create window-based programming using applet and Graphics programming.	PO2, PO6, PO7

SEC7		Biometrics
CO1.	To understand the basic concepts and the functionality of the Biometrics, Face Biometrics, Types, Architecture and Applications.	PO1,PO3,PO6,PO8
CO2.	To know the concepts Retina and Iris Biometrics and Vein and Fingerprint Biometrics.	PO1,PO2, PO3, PO6
CO3.	To analyses the Privacy Enhancement and Multimodal Biometrics.	PO3,PO5
CO4.	To get analytical idea on Watermarking Techniques	PO1,PO2, PO3,PO7
CO5.	To Gain knowledge on Future scope of Biometrics, and Study of various Biometric Techniques.	PO2, PO6, PO7
Core-IX		Operating Systems
CO1.	Define the fundamentals of OS and identify the concepts relevant to process, process lifecycle, Scheduling Algorithms, Deadlock and Memory management	PO1
CO2.	Know the critical analysis of process involving various algorithms, an exposure to threads and semaphores	PO1,PO2
CO3.	Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measures to retrieve from deadlock..	PO4,PO6
CO4.	Have complete knowledge of Scheduling Algorithms and its types.	PO4,PO5,PO6
CO5.	Understand memory organization and management	PO3,PO8
Core-X		ASP.Net Programming
CO1.	Develop working knowledge of C# programming constructs and the .NET Framework	PO1, PO2, PO6
CO2.	To develop a software to solve real-world problems using ASP.NET	PO2, PO3, PO5
CO3.	To Work On Various Controls Files	PO1, PO3, PO6

CO4.	To create a web application using MicrosoftADO.NET.	PO2, PO6
CO5.	To develop web applications using XML	PO1, PO3, PO6
Core-XI Data analytics Using R Programming		
CO1.	Work with big data tools and its analysis techniques	PO1
CO2.	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
CO3.	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6
CO4.	Perform analytics on data streams.	PO4, PO5, PO6
CO5.	Learn No SQL databases and management.	PO3, PO8
Core-XII R Programming-LAB		
CO1.	Acquire programming skills in core R Programming	PO1,PO4, PO5,
CO2.	Acquire Object-oriented programming skills in R Programming.	PO1,PO4, PO8,
CO3.	Develop the skill of design in graphical-user interfaces(GUI)in R Programming	PO1,PO3, PO6
CO4.	Acquire R Programming skills to move into Specific branches	PO3,PO4,
CO5.	Learn No SQL databases and management.	PO1PO5, PO6
Elective-V Image Processing		
CO1.	Understand the fundamental concepts of digital image processing.	PO1
CO2.	Understand various 2D Image transformations	PO1, PO2
CO3.	Understand image enhancement processing techniques and filters	PO4, PO6
CO4.	Understand the classification of Image segmentation techniques	PO4, PO5, PO6
CO5.	Understand various image compression techniques	PO3, PO5

Elective-V		Computational Intelligence
CO1.	Describe the fundamentals of artificial intelligence concepts and searching techniques.	PO1
CO2.	Develop the fuzzy logic sets and membership function and defuzzification techniques.	PO1, PO2
CO3.	Understand the concepts of Neural Network and analyze and apply the learning techniques	PO4, PO6
CO4.	Understand the artificial neural networks and its applications.	PO4, PO5, PO6
CO5.	Understand the concept of Genetic Algorithm and Analyze the optimization problems using GAs.	PO3, PO8
Elective-VI		Artificial Intelligence
CO1.	Understand the various concepts of AI Techniques.	PO1
CO2.	Understand various Search Algorithm in AI.	PO1, PO2
CO3.	Understand probabilistic reasoning and models in AI.	PO4, PO6
CO4.	Understand Markov Decision Process.	PO4, PO5, PO6
CO5.	Understand various type of Reinforcement learning Techniques.	PO3, PO4
Elective-VI		Information Security
CO1.	Understand network security threats, security Services ,and counter measures	PO1
CO2.	Understand vulnerability analysis of network security	PO1,PO2
CO3.	Acquire background on hash functions; authentication; firewalls; intrusion detection techniques	PO4,PO6
CO4.	Gain hands-on experience with programming and simulation techniques for security protocols.	PO4,PO5,PO6
CO5.	Apply methods for authentication, access control, Intrusion detection and prevention	PO3,PO8
Supportive Course		Internship / Industrial Training

CO1.	Understand about Software techniques.	PO1,PO2
CO2.	Understand about Software project management skills, design and quality management	PO2, PO3
CO3.	Analyze on Software Requirements and Specification	PO3, PO4
CO4.	Analyze on Software Testing, Maintenance	PO4, PO5
CO5.	Design and conduct various types and levels of software quality for a software project	PO5, PO6
Core-XIII Computer Networks		
CO1.	To Understand the basics of Computer Network architecture, OSI and TCP/IP reference models	PO1
CO2.	To gain knowledge on Telephone systems using wireless network	PO1, PO2
CO3.	To understand the concept of MAC	PO4, PO6
CO4.	To analyze the characteristics of Routing and Congestion control algorithms	PO4, PO5, PO6
CO5.	To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS	PO3, PO4
Core-XIV ASP.Net Programming LAB		
CO1.	To create web applications and implement various controls	PO1,PO2, PO3,PO4, PO5, PO6
CO2.	Create web pages in Rich control.	PO1,PO2,PO3,PO4, PO5, PO6
CO3.	Develop knowledge about file handling operations	PO1,PO2,PO3, PO4, PO5, PO6
CO4.	An ability to design XML classes	PO1,PO2,PO3,PO4, PO5, PO6
CO5.	To develop a software to solve real-world problems using ASP.NET	PO1,PO2,PO3,PO4, PO5, PO6
Core-XV Project with viva voce		

Semester-III		Tally Lab
CO1.	Get idea about creation and alteration of company profile	PO1,PO2, PO3,PO4, PO5, PO6
CO2.	Understand and apply various accounting voucher entries	PO1,PO2,PO3,PO4, PO5, PO6
CO3.	Acquire the knowledge in bank reconciliation statement preparation and stock summary.	PO1,PO2,PO3, PO4, PO5, PO6
CO4.	Designed to impart knowledge regarding concepts of Financial Accounting.	PO1,PO2,PO3,PO4, PO5, PO6
CO5.	Required skills and can also be employed as Tally data entry operator.	PO1,PO2,PO3,PO4, PO5, PO6
Semester-V		IPR, Plagiarism, Copyrights And Patents
CO1.	Understand and use the basic concepts of Intellectual property Rights	PO1,PO2, PO3,PO4, PO5, PO6
CO2.	Examine the Concepts of Intellectual property Rights such as Plagiarism, Copyrights, Infringement, Patents and Licensing	PO1,PO2,PO3,PO4, PO5, PO6
CO3.	To identify the significance of practice and procedure of Patents.	PO1,PO2,PO3, PO4, PO5, PO6
CO4.	Demonstrate the procedure obtaining copyrights, Trademarks and Industrial Design.	PO1,PO2,PO3,PO4, PO5, PO6
CO5.	Evaluate to enable the students to keep their IP rights alive	PO1,PO2,PO3,PO4, PO5, PO6
VALUE ADDED COURSES		
Semester-II		Hardware And Troubleshooting
CO1.	Obtaining knowledge of troubleshoot the hardware components of a computer.	PO1,PO2, PO3,PO4, PO5, PO6
CO2.	Comprehending the troubleshooting techniques for storage devices, input and output devices.	PO1,PO2,PO3,PO4, PO5, PO6
CO3.	Applying the troubleshooting techniques for hardware failures.	PO1,PO2,PO3, PO4, PO5, PO6
CO4.	Examining the troubleshooting techniques in Network, Printers and Mother board.	PO1,PO2,PO3,PO4, PO5, PO6
CO5.	Assembling a new system with standard hardware component	PO1,PO2,PO3,PO4, PO5, PO6
Semester-IV		Application Development in Programming Languages

