



Andhra Pradesh State Council of Higher Education

B.Sc., Honours in Computer Science MAJOR

w.e.f AY 2023-24 onwards

COURSE STRUCTURE

Year	Semester	Course	Title	Hrs./ Week	Credits		
I	I	1	Essentials and applications of Mathematical, Physical and Chemical Sciences	5	4		
		2	Advances in Mathematical, Physical and Chemical Sciences	5	4		
	II	3	Problem Solving using C - (T)	3	3		
			Problem Solving using C- (P)	2	1		
		4	Digital Logic Design- (T)	3	3		
			Digital Logic Design- (P)	2	1		
II	III	5	Object Oriented Programming using Java- (T)	3	3		
			Object Oriented Programming using Java - (P)	2	1		
		6	Data Structures using C - (T)	3	3		
			Data Structures using C - (P)	2	1		
		7	Computer Organization - (T)	3	3		
			Computer Organization- (P)	2	1		
		8	Operating Systems - (T)	3	3		
			Operating Systems - (P)	2	1		
	IV	9	Database Management System - (T)	3	3		
			Database Management System - (P)	2	1		
		10	Object Oriented Software Engineering - (T)	3	3		
			Object Oriented Software Engineering - (P)	2	1		
		11	Data Communications and Computer Networks - (T)	3	3		
			Data Communications and Computer Networks - (P)	2	1		
		III	V	12	Web Interface Designing Technologies - (T)	3	3
					Web Interface Designing Technologies - (P)	2	1
13	Web Applications Development using PHP & MYSQL - (T)			3	3		
	Web Applications Development using PHP & MYSQL - (P)			2	1		
14 A	Internet of Things (T)			3	3		
	Internet of Things (P)			2	1		
	OR						
14 B	Foundations of Data Science - (T)			3	3		

IV	VI		Foundations of Data Science - (P)	2	1
		15 A	IoT Applications Development and Programming - (T)	3	3
			IoT Applications Development and Programming - (P)	2	1
			OR		
		15 B	Application development using Python - (T)	3	3
			Application development using Python - (P)	2	1
		Internship/ Apprenticeship			
	VII	16 A	Advanced Data Structures - (T)	3	3
			Advanced Data Structures - (P)	2	1
			OR		
		16 B	Artificial Intelligence - (T)	3	3
			Artificial Intelligence - (P)	2	1
		17 A	Computer Graphics - (T)	3	3
			Computer Graphics - (P)	2	1
			OR		
		17 B	Design and Analysis of Algorithms - (T)	3	3
			Design and Analysis of Algorithms - (P)	2	1
		18 A	Principles of Machine Learning - (T)	3	3
			Principles of Machine Learning - (P)	2	1
			OR		
		18 B	Software Testing- (T)	3	3
Software Testing- (P)			2	1	
SEC		19 A	Advanced Java Programming - (T)	3	3
			Advanced Java Programming - (P)	2	1
			OR		
	19 B	Mobile Application Development - (T)	3	3	
		Mobile Application Development - (P)	2	1	
	20 A	MEAN Stack Development - (T)	3	3	
MEAN Stack Development - (P)		2	1		
	OR				
20 B	R Programming - (T)	3	3		
	R Programming - (P)	2	1		
VIII	21 A	Big Data Technologies - (T)	3	3	
		Big Data Technologies - (P)	2	1	
		OR			
	21 B	Compiler Design - (T)	3	3	
		Compiler Design - (P)	2	1	
	22 A	Data Mining Concepts & Techniques - (T)	3	3	
Data Mining Concepts & Techniques - (P)		2	1		
	OR				
22 B	Digital Image Processing - (T)	3	3		
	Digital Image Processing - (P)	2	1		

		23A	Information Security and Cryptography - (T)	3	3	
			Information Security and Cryptography - (P)	2	1	
			OR			
		23 B	Mobile ADHOC and Sensor Networks - (T)	3	3	
			Mobile ADHOC and Sensor Networks - (P)	2	1	
		SEC	24 A	Advanced DBMS - (T)	3	3
	Advanced DBMS - (P)			2	1	
			OR			
	24 B		Cloud Computing - (T)	3	3	
			Cloud Computing - (P)	2	1	
	25 A		Computer Vision - (T)	3	3	
			Computer Vision - (P)	2	1	
			OR			
	25 B		Digital Forensics - (T)	3	3	
			Digital Forensics - (P)	2	1	

Government Degree College, Paderu
Department of Computer Science
Course Objective and Course Outcomes
Academic Year 2023-24

B.Sc(Computer Science- Honours) Single Major

Course Name: 1. Essentials and Applications Of Mathematical, Physical and Chemical Sciences, Year: I, Semester: I

Course Objectives:

- The objective of this course is to provide students with a comprehensive understanding of the essential concepts and applications of mathematical, physical, and chemical sciences.
- The course aims to develop students' critical thinking, problem-solving, and analytical skills in these areas, enabling them to apply scientific principles to real-world situations.

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.
2. To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations
3. To Explain the basic principles and concepts underlying a broad range of fundamental areas of chemistry and to Connect their knowledge of chemistry to daily life
4. Understand the interplay and connections between mathematics, physics, and chemistry in various applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
5. To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures.

**Course Name: 2. Advances in Mathematical, Physical and Chemical Sciences,
Year: I, Semester: I**

Course Objectives:

The objective of this course is to provide students with an in-depth understanding of the recent advances and cutting-edge research in mathematical, physical, and chemical sciences. The course aims to broaden students' knowledge beyond the foundational concepts and expose them to the latest developments in these disciplines, fostering critical thinking, research skills, and the ability to contribute to scientific advancements.

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems.
2. To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations.
3. Understand the different sources of renewable energy and their generation processes and advances in nanomaterials and their properties, with a focus on quantum dots. To study the emerging field of quantum communication and its potential applications. To gain an understanding of the principles of biophysics in studying biological systems. Explore the properties and applications of shape memory materials.
4. Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of nanosensors. Explore the effects of chemical pollutants on ecosystems and human health.
5. Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used

Course Name: 3.Problem Solving using C, Year: I, Semester: II

Course Objectives:

1. To explore basic knowledge on computers
2. Learn how to solve common types of computing problems.
3. Learn to map problems to programming features of C.
4. Learn to write good portable C programs.

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand the working of a digital computer and Fundamental constructs of Programming
2. Analyze and develop a solution to a given problem with suitable control structures
3. Apply the derived data types in program solutions
4. Use the 'C' language constructs in the right way
5. Apply the Dynamic Memory Management for effective memory utilization

Course Name: 4.Digital Logic Design, Year: I, Semester: II

Course Objectives:

To familiarize with the concepts of designing digital circuits.

Course Outcomes:

Upon successful completion of the course, the students will be able to

1. Understand how to Convert numbers from one radix to another radix and perform arithmetic operations.
2. Simplify Boolean functions using Boolean algebra and k- maps
3. Design adders and subtractors circuits
4. Design combinational logic circuits such as decoders, encoders, multiplexers and demultiplexers.
5. Use flip flops to design registers and counters.

Course Name: 5. Object Oriented Programming using Java, Year: II, Semester: III

Course Objective:

To introduce the fundamental concepts of Object-Oriented programming and to design & implement object-oriented programming concepts in Java.

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand the basic concepts of Object-Oriented Programming and Java Program Constructs
2. Implement classes and objects and analyze Inheritance and Dynamic Method Dispatch
3. Demonstrate various classes in different packages and can design own packages
4. Manage Exceptions and Apply Threads
5. Create GUI screens along with event handling

Course Name: 6. Data Structures using C, Year: II, Semester: III

Course Objectives:

To introduce the fundamental concept of data structures and to emphasize the importance of various data structures in developing and implementing efficient algorithms.

Course outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand various Data Structures for data storage and processing.
2. Realize Linked List Data Structure for various operations
3. Analyze step by step and develop algorithms to solve real world problems by implementing Stacks, Queues data structures.
4. Understand and implement various searching & sorting techniques.
5. Understand the Non-Linear Data Structures such as Binary Trees and Graphs

Course Name: 7. Computer Organization, Year: II, Semester: III

Course Objectives:

To familiarize with organizational aspects of memory, processor and I/O.

Course Learning Outcomes:

Upon successful completion of the course, the students will be able to

1. Identify different types of instructions
2. Differentiate between micro-programmed and hard-wired control units.
3. Analyze the performance of hierarchical organization of memory.
4. Summarize different data transfer techniques.
5. Demonstrate arithmetic operations on fixed- and floating-point numbers and illustrate concepts of parallel processing.

Course Name: 8. Operating Systems, Year: II, Semester: III

Course Objectives:

To gain knowledge about various functions of an operating system like memory management, process management, device management, etc.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Demonstrate knowledge and comprehension of operating system functions.
2. Analyze different process scheduling algorithms and apply them to manage processes and threads effectively
3. Create strategies to prevent, detect, and recover from deadlocks, and design solutions for inter-process communication and synchronization problems.
4. Compare and contrast different memory allocation strategies and evaluate their effectiveness
5. Evaluate disk scheduling algorithms while implementing OS security measures

Course Name: 9. Database Management Systems Year: II, Semester: IV

Course Objectives:

To familiarize with concepts of database design.

Course Outcomes:

On successful completion of the course, students will be able to

1. Differentiate between database systems and file based systems
2. Design a database using ER model
3. Use relational model in database design
4. Use SQL commands for creating and manipulating data stored in databases.
5. Write PL/SQL programs to work with databases.

Course Name: 10. Object Oriented Software Engineering Year: II Semester: IV

Course Objectives:

To introduce Object-oriented software engineering (OOSE) - which is a popular technical approach to analyzing, designing an application, system, or business by applying the object-oriented paradigm and visual modeling.

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand and apply the fundamental principles of Object-Oriented Programming (OOP) concepts and Unified Modeling Language (UML) basics, in the development of software solutions.
2. Analyze and specify software requirements, develop use cases and scenarios, apply object-oriented analysis and design (OOAD) principles
3. Familiar with the concept of test-driven development (TDD) and its practical implementation
4. Analyze and Evaluate Software Maintenance and Evolution Strategies
5. Apply Advanced Object-Oriented Software Engineering Concepts.

Course Name: 11. Data Communication and Computer Networks, Year: II, Semester: IV

Course Objectives:

To provide students with a comprehensive understanding of networking principles, protocols, and technologies, enabling them to design, analyze, and evaluate efficient and reliable network solutions.

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand and apply network applications, hardware, software, and reference models for network communication.
2. Design and analyze data link layer protocols, multiple access protocols, and wireless LAN technologies.
3. Design routing algorithms, congestion control algorithms, and evaluate network layer protocols for internetworking.
4. Analyze transport service, transport protocols, and evaluate UDP and TCP in the internet.
5. Understand and evaluate application layer protocols, including DNS, email, WWW, and network management protocols.

Course Name: 12. Web Interface Designing Technologies Year: III, Semester: V

Course Objectives:

To enable students to understand web architecture, develop aesthetic websites, create static and dynamic web pages, implement user interactivity, and gain proficiency in installing and utilizing WordPress and plugins

Course Learning Outcomes:

On successful completion of the course, students will be able to

1. Understand and appreciate the web architecture and services along with its basic building blocks
2. Gain knowledge about various components of a website related to aesthetics
3. Demonstrate skills regarding creation of a static website and addition of dynamic behavior to a website

4. Get experience on making user-interactive web pages.
5. Learn how to install word press and gain the knowledge of installing various plugins to use in their websites.

Course Name: 13. Web Applications Development using PHP & MYSQL, Year: III, Semester: V

Course Objectives:

To enable students to understand open-source tools to create dynamic web pages, implement user interactivity, and gain proficiency in developing web sites

Course Learning Outcomes:

On successful completion of the course, students will be able to

1. Write simple programs in PHP.
2. Understand how to use regular expressions, handle exceptions, and validate data using PHP.
3. Apply In-Built functions and Create User defined functions in PHP programming.
4. Write PHP scripts to handle HTML forms.
5. Know how to use PHP with a MySQL database and can write database driven web pages.

Course Name: 14A.Internet of Things Year: III, Semester: V

Course Objectives:

To enable students to understand basic IoT constructs, create IoT solutions to real world problems using IoT.

Course Learning Outcomes:

On successful completion of the course, students will be able to

1. Understand various concepts, terminologies and applications of IoT
2. Learn how to build IoT devices with development boards
3. Understand various Wireless protocols for IoT
4. Learn how to use various sensors and actuators & develop IoT solutions using Arduino
5. Develop and Connect IoT with Cloud Platforms.

Course Name: 14B. Foundations of Data Science, Year: III, Semester: V

Course Objectives:

To enable students to understand basics data science concepts.

Course Learning Outcomes:

On successful completion of the course, students will be able to

1. Identify the need for data science and understand various data collection strategies
2. Understand about NoSQL and Descriptive Statistics
3. Apply Numpy methods to process the data in an array.
4. Summarize and Compute Descriptive Statistics using Pandas.
5. Apply powerful data manipulations visualization using Pandas.

Course Name: 15A. IoT Applications Development and Programming, Year: III, Semester: V

Course Objectives:

To enable students to develop IoT solutions for real-world problems

Course Learning Outcomes:

On successful completion of the course, students will be able to

1. Understand the Basic Concepts of Internet of Things
2. Learn various Sensors and their associative protocols
3. Learn the Single Board Computers for development of IoT
4. Build the IoT devices with the Node-RED without Complex coding
5. Develop various IoT real-time applications

Course Name: 15B. Application Development using Python, Year: III, Semester: V

Course Objectives:

To enable students to develop applications for real-world problems using Python.

Course Learning Outcomes:

On successful completion of the course, students will be able to

1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
4. Interpret the concepts of Web Programming and GUI in Python
5. Apply concepts of Python programming in various fields related to IOT, Web Services and Databases in Python.

Course Name: 16A. Advanced Data Structures, Year: IV, Semester: VII

Course Objectives:

To familiarize with the organization of data so as to optimize the searching time.

Course Learning Outcomes:

Upon completion of the course, students will be able to:

1. Apply appropriate hashing techniques for a given problem.
2. Simulate the operations of Heap trees.
3. Provide solutions using multi-way search trees.
4. Choose appropriate algorithm while establishing a network.
5. Apply the knowledge of disjoint sets for solving a given problem.

Course Name: 16B.Artificial Intelligence, Year: IV, Semester: VII

Course Objectives:

To provide students with a comprehensive understanding of artificial intelligence (AI) principles and techniques.

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Analyze AI problems and search techniques using underlying assumptions and AI techniques.
2. Apply heuristic search techniques for problem-solving and optimization.
3. Understand knowledge representation approaches and apply predicate logic for representing facts and relationships.
4. Utilize rule-based systems for representing knowledge and apply reasoning techniques for problem-solving.
5. Implement symbolic reasoning under uncertainty and augment problem-solving strategies with non-monotonic reasoning.

Course Name: 17 A. Computer Graphics, Year: IV, Semester: VII

Course Objectives:

To develop a comprehensive understanding of computer graphics principles, techniques, and algorithms, and apply them to create visually appealing 2D and 3D graphics.

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand computer graphics fundamentals
2. Perform 2D and 3D
3. Apply window-to-view port transformation and perform line and polygon clipping operations.
4. Determine visible surfaces and apply computer graphics algorithms for depth comparison, back-face removal, and rendering.
5. Apply animation principles, work with Flash interface, and gain an introduction to virtual reality.

Course Name: 17 B. Design and Analysis of Algorithms, Year: IV, Semester: VII

Course Objectives:

To design, develop and analyze algorithms to provide optimal solutions

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand the fundamental concepts of algorithm analysis and design techniques.
2. Apply divide and conquer design techniques for solving problems
3. Analyze the performance of given problem using greedy approach.
4. Analyze the given problem and provide the feasible solution using dynamic programming.
5. Analyze the complexity of a given problem.

Course Name: 18A. Principles of Machine Learning Year: IV, Semester: VII

Course Objectives:

To understand various concepts of machine learning.

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand the features of machine learning to apply on real world problems.
2. Characterize the machine learning algorithms as supervised learning and unsupervised learning, apply and analyze the various algorithms of supervised and unsupervised learning.
3. Analyze the concept of neural networks for learning linear and non-linear activation functions.
4. Identify an appropriate clustering technique to solve real world problems.
5. Choose a suitable machine learning model, implement and examine the performance of the chosen model for a given real world problems.

Course Name: 18B. Software Testing Year: IV, Semester: VII

Course Objectives:

To provide students with a comprehensive understanding of software testing principles, methodologies, and tools, enabling them to effectively design and execute various levels of testing, automate testing processes using Selenium and automation frameworks.

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand software testing principles and apply effective test case design strategies.
2. Implement and execute different levels of testing
3. Utilize Selenium for automation testing, including handling web elements and utilizing advanced features.
4. Implement and leverage automation testing frameworks for efficient test automation.
5. Apply TestNG framework for advanced test execution, management, and parallel processing.

Course Name: 19 A. Advanced Java Programming Year: IV, Semester: VII

Course Objectives:

To provide students with a comprehensive understanding of Java Enterprise Edition (J2EE) and its associated technologies for developing robust and scalable web applications.

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand the multi-tier architecture of J2EE and its implementation in enterprise applications.
2. Develop web applications using Java Servlets and establish database connectivity with JDBC.
3. Create dynamic and interactive web pages using Java Server Pages (JSP) and implement JSP with beans and custom tag libraries.
4. Build enterprise applications using Enterprise Java Beans (EJB) and understand their deployment and configuration.
5. Utilize various Java technologies such as JavaMail, CORBA, and Java RMI for effective communication and distributed computing.

Course Name: 19 B.MEAN Stack Development Year: IV, Semester: VII

Course Objectives:

To provide students with the knowledge and skills necessary to develop web applications using modern web development frameworks and technologies, including JavaScript, Node.js, Express, MongoDB, and AngularJS

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Gain a comprehensive understanding of web development frameworks, JavaScript fundamentals, and DOM manipulation.
2. Develop proficiency in creating Node.js applications, handling data I/O operations, and utilizing events and callbacks.
3. Build RESTful services using Node.js and Express framework, mastering HTTP handling and routing.
4. Acquire knowledge and skills in working with MongoDB, performing CRUD operations, and utilizing Mongoose for database integration.
5. Learn to build single-page applications (SPAs) using AngularJS, implementing two-way data binding and MVC architecture.

Course Name: 20 A. Mobile Application Development Year: IV, Semester: VII

Course Objectives:

To provide students with a comprehensive understanding of mobile application development using the Android platform.

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Gain a solid understanding of mobile application development principles
2. Develop proficiency in setting up the Android development environment
3. Acquire the necessary skills to handle and manage Android resources effectively
4. Develop expertise in designing user interfaces by utilizing a wide range of UI widgets
5. Learn various storage techniques in Android and Understand how to integrate web applications

Course Name: 20 B. R Programming Year: IV, Semester: VII

Course Objectives:

To equip students with the knowledge and skills to effectively use R programming language for data analysis, including data manipulation, visualization, and statistical modelling, enabling them to make data-driven decisions and insights.

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Gain a solid understanding of R programming language
2. Acquire knowledge and skills in manipulating matrices, lists, and data frames, including performing operations and applying functions.
3. Develop the ability to create user-defined functions, handle variable scope, and perform exploratory data analysis, including data preprocessing and descriptive statistics.
4. Learn various data visualization techniques in R, including basic and advanced visualizations, as well as creating 3D plots.
5. Gain proficiency in inferential statistics and regression analysis using R, including simple linear regression and multiple linear regression.

Course Name: 21A. Big Data Technologies Year: IV, Semester: VIII

Course Objectives:

To provide students with a comprehensive understanding of Big Data technologies, including Apache Hadoop, Hive, HBase, and Zookeeper, and develop practical skills in data processing, querying, and analytics for large-scale datasets.

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand the importance and challenges of Big Data, including its classification and applications.
2. Familiarize with Apache Hadoop and learn data movement and MapReduce algorithms.
3. Explore Hadoop architecture, including HDFS, MapReduce tasks, and cluster setup.
4. Develop skills in Hive and HiveQL for querying and analyzing data in Hadoop.
5. Gain proficiency in HBase, including schema design, advanced indexing, and working with Zookeeper for cluster monitoring.

Course Name: 21B. Compiler Design Year: IV, Semester: VIII

Course Objectives:

To provide students with a comprehensive understanding of compiler design principles and techniques, including lexical analysis, syntax analysis, intermediate code generation, error handling, storage organization, code generation, and optimization.

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand the compiler structure and the process of lexical analysis using finite automata.
2. Acquire knowledge of syntax analysis techniques, including recursive descent parsing, predictive parsing, and LR parsing.
3. Learn about syntax-directed translation, intermediate code generation, and error detection and recovery methods in compilers.
4. Explore storage organization, dynamic storage allocation, error recovery methods, and code generation issues in compilers.
5. Develop an understanding of code optimization techniques, machine-dependent optimization, register allocation, and machine-independent optimization in compilers.

Course Name: 22 A. Data Mining Concepts and Techniques Year: IV, Semester: VIII

Course Objectives:

To provide students with a thorough understanding of data warehousing and data mining concepts, techniques, and applications.

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand data warehousing concepts, including data warehouse architecture, multidimensional data models, and OLAP operations.
2. Explore the fundamentals of data mining, including its definition, techniques, and applications in real-world scenarios.
3. Develop knowledge and skills in clustering techniques, including partitioning algorithms, hierarchical clustering, and categorical clustering.

4. Acquire proficiency in decision tree construction and the use of decision tree algorithms for data analysis and prediction.
5. Gain exposure to various advanced data mining techniques, such as neural networks, genetic algorithms, and text mining, including web mining concepts and applications.

Course Name: 22 B. Digital Image Processing Year: IV, Semester: VIII

Course Objectives:

To provide students with a comprehensive understanding of digital image processing concepts, techniques, and applications.

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand digital image processing fundamentals and applications in various domains.
2. Develop skills in spatial domain image enhancement techniques
3. Acquire proficiency in frequency domain image enhancement
4. Master in image segmentation techniques
5. Learn image compression principles.

Course Name: 23 A. Information Security and Cryptography Year: IV, Semester:

VIII

Course Objectives:

To provide students with a comprehensive understanding of cryptography and network security concepts and their practical applications

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Demonstrate the knowledge of cryptography, network security concepts and applications.
2. Develop security mechanisms to protect computer systems and networks.
3. Apply security principles in system design.
4. Apply methods for authentication, access control, intrusion detection and prevention.
5. Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

Course Name: 23 B. Mobile Ad hoc and Sensor Networks Year: IV, Semester: VIII

Course Objectives:

To provide students with a comprehensive understanding of ad hoc wireless networks, including their fundamentals, protocols, and security mechanisms

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand the concept of ad-hoc and sensor networks, their applications and typical node and network architectures.
2. Describe the MAC protocol issues of ad hoc networks.
3. Identify and describe routing protocols for ad hoc wireless networks with respect to TCP design issues.
4. Explain the concepts of network architecture and MAC layer protocol for WSN.
5. Familiar with the OS used in Wireless Sensor Networks and build basic modules.

Course Name: 24 A. Advanced Database Management Systems Year: IV, Semester: VIII

Course Objectives:

To provide students with a through theoretical knowledge and practical application of advanced topics in database management systems

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Gain understanding of relational database concepts, functional dependencies, and correctness of FDs.
2. Analyze and apply normalization techniques (3NF, BCNF, 4NF, 5NF)
3. Develop skills in processing joins, grasp materialized vs. pipelined processing
4. Learn principles of correct interleaved execution, locking mechanisms (2PL), handle deadlocks.
5. Acquire knowledge of T/O-based techniques, multi-version approach.

Course Name: 24 B. Cloud Computing Year: IV, Semester: VIII

Course Objectives:

To provide students with a comprehensive understanding of cloud computing concepts, virtualization technologies, and different service models in the context of cloud computing.

The course will explore the origins, components, and essential characteristics of cloud computing, along with the benefits and limitations associated with its adoption

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand the essential characteristics and benefits of cloud computing
2. Gain knowledge of virtualization technologies
3. Explore Microsoft implementation of virtualization and understand different cloud deployment models and their advantages.
4. Learn about Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) models,
5. Explore Software as a Service (SaaS) and its service providers

Course Name: 25 A. Computer Vision Year: IV, Semester: VIII

Course Objectives:

To equip the students with the knowledge and skills to analyze and interpret images, detect and recognize objects, estimate motion, and apply computer vision techniques in various domains such as biometrics, medical image analysis, surveillance, and augmented reality.

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Understand the fundamental concepts of computer vision and its applications in various domains.
2. Apply color and geometric transforms, edge-detection techniques, filtering, and mathematical operations to analyze images.
3. Comprehend the concept of motion estimation and its applications.
4. Apply shape correspondence, shape matching, principal component analysis, and shape priors for object recognition.
5. Explore various applications of computer vision.

Course Name: 25 B. Digital Forensics Year: IV, Semester: VIII

Course Objectives:

To equip students with the knowledge and skills necessary to effectively handle digital investigations, ensuring the preservation, analysis, and presentation of digital evidence in a legally sound manner.

Course Learning Outcomes:

Students after successful completion of the course will be able to:

1. Gain a clear understanding of the fundamentals of digital forensics
2. Develop knowledge and skills in analyzing storage media and file systems
3. Learn about network forensics and acquire practical skills in network packet sniffing, analysis using tools like Wireshark and TCPDUMP
4. Gain expertise in logs and event analysis, data carving
5. Develop proficiency in wireless and web attacks.

Government Degree College, Paderu
Department of Computer Science
Course Objective and Course Outcomes
(2018-19, 2019-20)

**Course Name: 1. Computer Fundamentals and Photoshop, Year: I,
Semester: I**

Course Objectives:

1. Learn to various generations of computers
2. Learn to various input and output devices.
3. Learn to Photoshop tool box.

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. To explore basic knowledge on computers
2. To acquire knowledge on working of I/O devices, memories
3. To explore knowledge on Adobe Photoshop
4. To work with Adobe Photoshop tool box.
5. To create basic designs using Adobe Photoshop

Course Name: 2. Programming in C, Year: I, Semester: II

Course Objectives:

1. Learn how to solve common types of computing problems.
2. Learn data types and control structures of C
3. Learn to map problems to programming features of C.
4. Learn to write good portable C programs.

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. Appreciate and understand the working of a digital computer
2. Analyse a given problem and develop an algorithm to solve the problem
3. Improve upon a solution to a problem
4. Use the 'C' language constructs in the right way
5. Design, develop and test programs written in 'C'

Course Name: 3. Data Structures, Year: II, Semester: III

Course Objectives:

To introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms.

Course Outcomes:

1. Describe how arrays, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms
2. Describe common applications for arrays, linked structures, stacks, queues, trees, and graphs.
3. Write programs that use arrays, linked structures, stacks, queues, trees, and graphs
4. Demonstrate different methods for traversing trees.
5. Compare alternative implementations of data structures with respect to performance
6. Compare and contrast the benefits of dynamic and static data structures implementations
7. Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack.
8. Discuss the computational efficiency of the principal algorithms for sorting, searching.

**Course Name: 4. Object Oriented Programming Using JAVA, Year: II,
Semester: IV**

Course Objectives:

As the business environment becomes more sophisticated, the software development is becoming increasingly complex. As of the best programming paradigm which helps to eliminate complexity of large projects, Object Oriented Programming (OOP) has become the predominant technique for writing software in the past decade. Many other important software development techniques are based upon the fundamental ideas captured by object-oriented programming.

Course Outcomes:

At the end of this course student will:

1. Understand the concept and underlying principles of Object-Oriented Programming
2. Understand how object-oriented concepts are incorporated into the Java programming language
3. Develop problem-solving and programming skills using OOP concept
4. Understand the benefits of a well-structured program
5. Develop the ability to solve real-world problems through software development in high-level programming language like Java
6. Develop efficient Java applets and applications using OOP concept
7. Become familiar with the fundamentals and acquire programming skills in the Java language.

Course Name: 5. Database Management Systems, Year: III, Semester: V

Course Objective:

1. Design & develop database for large volumes & varieties of data with optimized data processing techniques.
2. Learn to logical database design using ER diagrams.
3. Learn to relational model.
4. Learn to SQL and PL/SQL.

Course Outcomes:

On completing the subject, students will be able to:

1. Design and model of data in database.
2. Store, Retrieve data in database.
3. To explore knowledge on Relational Model
4. To write queries using SQL
5. To write programs using PL/SQL

Course Name: 6. Software Engineering, Year: III, Semester: V

Course Objectives:

The Objective of the course is to assist the student in understanding the basic theory of software engineering, and to apply these basic theoretical principles to a group software development project.

Course outcomes:

1. Ability to gather and specify requirements of the software projects.
2. Ability to analyse software requirements with existing tools
3. Able to differentiate different testing methodologies
4. Able to understand and apply the basic project management practices in real life projects
5. Ability to work in a team as well as independently on software projects

Course Name: 7A Operating Systems (Elective) , Year : III, Semester: VI

Course Objectives:

1. To understand the services provided by and the design of an operating system.
2. To understand the structure and organization of the file system.
3. To understand what a process is how processes are synchronized and scheduled.
4. To understand different approaches to memory management.
5. Students should be able to use system calls for managing processes, memory and the file system.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Analyze the concepts of processes in operating system and illustration of the scheduling of processes for a given problem instance.
2. identify the deadlock situation and provide appropriate solution so that protection and security of the operating system is also maintained.
3. Analyze memory management techniques, concepts of virtual memory and disk scheduling.
4. Understand the implementation of file systems and directories along with the interfacing of IO devices with the operating system.

Course Name: 7B Computer Networks (Elective) , Year : III, Semester: VI

Course Objectives:

1. To provide an introduction to the fundamental concepts on data communication and the design of computer networks.
2. To get familiarized with the basic protocols of computer networks.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Identify the different components in a communication system and their respective roles.
2. Describe the technical issues related to Local Area Networks.
3. Identify the common technologies available in establishing LAN infrastructure.

Course Name: 7C Web Technologies (Elective), Year: III, Semester: VI

Course Objectives:

1. To provide knowledge on web architecture, web services, client side and server side scripting technologies to focus on the development of web-based information systems and web services.
2. To provide skills to design interactive and dynamic web sites.

Course Outcomes:

1. To understand the web architecture and web services.
2. To practice latest web technologies and tools by conducting experiments.
3. To design interactive web pages using HTML and Style sheets.
4. To study the framework and building blocks of .NET Integrated Development Environment.
5. To provide solutions by identifying and formulating IT related problems

Course Name: 8A1 Foundations of Data Science (Cluster Elective), Year: III, Semester: VI

Course Objectives:

Modern scientific, engineering, and business applications are increasingly dependent on data, existing traditional data analysis technologies were not designed for the complexity of the modern world. Data Science has emerged as a new, exciting, and fast-paced discipline that explores novel statistical, algorithmic, and implementation challenges that emerge in processing, storing, and extracting knowledge from Big Data.

Course Outcomes:

1. Able to apply fundamental algorithmic ideas to process data.
2. Learn to apply hypotheses and data into actionable predictions.
3. Document and transfer the results and effectively communicate the findings using visualization techniques.

**Course Name: 8A2 Big Data Technology (Cluster Elective), Year: III,
Semester: VI**

Course Objectives:

The Objective of this course is to provide practical foundation level training that enables immediate and effective participation in big data projects. The course provides grounding in basic and advanced methods to big data technology and tools, including MapReduce and Hadoop and its ecosystem.

Course Outcomes:

1. Learn tips and tricks for Big Data use cases and solutions.
2. Learn to build and maintain reliable, scalable, distributed systems with Apache Hadoop.
3. Able to apply Hadoop ecosystem components.

**Course Name: 8B1 Distributed Systems (Cluster Elective), Year: III,
Semester: VI**

Course Objectives:

- To expose the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission.
- To discuss multiple levels of distributed algorithms, distributed file systems, distributed databases, security and protection.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Create models for distributed systems.
2. Apply different techniques learned in the distributed systems.

**Course Name: 8B2 Cloud Computing (Cluster Elective), Year: III,
Semester: VI**

Course Objectives:

The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas and developing cloud based software applications on top of cloud platforms.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Compare the strengths and limitations of cloud computing.
2. Identify the architecture, infrastructure and delivery models of cloud computing.
3. Apply suitable virtualization concept.
4. Choose the appropriate cloud player, Programming Models and approach.
5. Address the core issues of cloud computing such as security, privacy and interoperability.
6. Design Cloud Services and Set a private cloud.

Government Degree College, Paderu
Department of Computer Science
Course Objective and Course Outcomes
(2020-21, 2021-22, 2022-23)

Course Name: 1. Problem Solving Using C, Year: I, Semester: I

Course Objectives:

This course aims to provide exposure to problem-solving through programming. It introduces the concepts of the C Programming language.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand the evolution and functionality of a Digital Computer.
2. Apply logical skills to analyze a given problem
3. Develop an algorithm for solving a given problem.
4. Understand 'C' language constructs like Iterative statements, Array processing, Pointers, etc.
5. Apply 'C' language constructs to the algorithms to write a 'C' language program

Course Name: 2. Data Structures using C , Year: I, Semester: I

Course Objectives:

To introduce the fundamental concept of data structures and to emphasize the importance of various data structures in developing and implementing efficient algorithms.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand available Data Structures for data storage and processing.
2. Comprehend Data Structure and their real-time applications - Stack, Queue, Linked List, Trees and Graph.
3. Choose a suitable Data Structures for an application.
4. Develop ability to implement different Sorting and Search methods.

5. Design and develop programs using various data structures.

Course Name: 3. Database Management Systems, Year: II, Semester: III

Course Objectives:

The objective of the course is to introduce the design and development of databases with special emphasis on relational databases.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Gain knowledge of Database and DBMS
2. Understand the fundamental concepts of DBMS with special emphasis on relational data model.
3. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
4. Model databases using ER Diagrams and design database schemas based on the model.
5. Create a small database using SQL.

Course Name: 4. Object Oriented Programming using JAVA, Year: II, Semester: IV

Course Objectives:

The objective of the course is to introduce the design and development of databases with special emphasis on relational databases.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand the benefits of a well-structured program.
2. Understand different computer programming paradigms.
3. Understand underlying principles of Object-Oriented Programming in Java.
4. Develop problem-solving and programming skills using OOP concepts
5. Develop the ability to solve real-world problems through software development in high-level programming language like Java.

Course Name: 5. Operating Systems, Year: II, Semester: IV

Course Objectives:

This course aims to introduce the structure and organization of a file system. It emphasizes various functions of an operating system like memory management, process management, device management, etc.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Know Computer system resources and the role of operating system in resource management with algorithms.
2. Understand Operating System Architectural design and its services.
3. Gain knowledge of various types of operating systems including Unix and Android.
4. Understand various process management concepts including scheduling, synchronization, and deadlocks.
5. Have a basic knowledge about multithreading.
6. Comprehend different approaches for memory management.
7. Understand and identify potential threats to operating systems and the security features design to guard against them.
8. Specify objectives of modern operating systems and describe how operating systems have evolved over time.
9. Describe the functions of a contemporary operating system

Course Name 6A: Web Interface Designing Technologies, Year: III, Semester: V

Course Objectives:

The objective of the course is to develop client side web applications using HTML, CSS and JavaScript also learn the concepts of WordPress.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand and appreciate the web architecture and services.
2. Gain knowledge about various components of a website.
3. Demonstrate skills regarding creation of a static website and an interface to dynamic website.

4. Learn how to install word press and gain the knowledge of installing various plug-in to use in their websites.

Course Name 7A: Web Applications Development using PHP & MySQL , Year: III, Semester: V

Course Objectives:

The objective of the course is to develop server side web applications using PHP and MySQL.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Write simple programs in PHP.
2. Understand how to use regular expressions, handle exceptions, and validate data using PHP.
3. Apply In-Built functions and Create User defined functions in PHP programming.
4. Write PHP scripts to handle HTML forms.
5. Write programs to create dynamic and interactive web based applications using PHP and MYSQL.
6. Know how to use PHP with a MySQL database and can write database driven web pages.

Course Name 6B: Internet of Things, Year: III, Semester: V

Course Objectives:

The objective of the course is to introduce concepts of Internet of Things.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Appreciate the technology for IoT
2. Understand various concepts, terminologies and architecture of IoT systems.
3. Understand various applications of IoT.
4. Learn how to use various sensors and actuators for design of IoT.
5. Learn how to connect various things to Internet.

6. Learn the skills to develop simple IOT Devices.

Course Name 7B: Application Development Using Python, Year: III, Semester: V

Course Objectives:

The objective of the course is to develop the applications using python programming.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand and appreciate the web architecture and services.
2. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
3. Demonstrate proficiency in handling Strings and File Systems.
4. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
5. Interpret the concepts of Object-Oriented Programming as used in Python.
6. Apply concepts of Python programming in various fields related to IOT, Web Services and Databases in Python.

Course Name 6C: Data Science, Year: III, Semester: V

Course Objectives:

The objective of the course is to introduce the data science and learn the basic concepts of statistics and machine learning.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Develop relevant programming abilities.
2. Demonstrate proficiency with statistical analysis of data
3. Develop the ability to build and assess data-based models.
4. Demonstrate skill in data management.
5. Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

Course Name 7C: Python for Data Science, Year: III, Semester: V

Course Objectives:

The objective of the course is to introduce python programming and implement various data science applications using Python.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Identify the need for data science and solve basic problems using Python built-in data types and their methods.
2. Design an application with user-defined modules and packages using OOP concept
3. Employ efficient storage and data operations using NumPy arrays.
4. Apply powerful data manipulations using Pandas.
5. Do data pre-processing and visualization using Pandas