

Karmaveer Shantarambapu Kondaji Wavare Arts, Science and Commerce College, CIDCO, Nashik Uttamnagar, Nashik- 422 008 (Maharashtra)

Affiliated to Savitribai Phule Pune University Id. No. PU/NS/ASC/047/1993

AISHE C-42086 NAAC Re-accredited 'A' Grade (III Cycle 2017-22, CGPA 3.20)

Best College Award of Savitribai Phule Pune University Pune in 2009-10 and 2021-22

Programme Outcomes (PO's) Internal Quality Assurance Cell



Programme
Specific Outcomes
(PSO's)



Course Outcomes (CO's)

Syllabus: 2013 Pattern





KARMAVEER SHANTARAMBAPU KONDAJI WAVARE ARTS, SCIENCE AND COMMERCE COLLEGE,CIDCO

Uttamnagar, Nashik- 422 008 (Maharashtra)

Principal
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M.Sc., Ph. D.

Affiliated to Savitribai Phule Pune University Id. No. PU/NS/ASC/047/1993

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Programme Outcome (PO's), Programme Specific Outcome (PSO's), Course Outcome (CO's)

Department: Computer Science

Syllabus: 2019 Pattern

Programme and Courses:

Sr. No.	Name of the Programme	Year of introduction of programme	Duration of introduction of Programme
1	B. Sc. Comp. Sci.	1998-99	3 Years

Programme Specific Outcome (B.Sc. Computer Science)

Sr. No.	Programme Specific Outcome (B.S. Computer Science)
PSO 1	Apply fundamental principles and methods of Computer Science to a wide range of applications.
PSO 2	Design, correctly implement and document solutions to significant computational problems.
PSO 3	Impart an understanding of the basics of our discipline.
PSO 4	Prepare for continued professional development.
PSO 5	Develop proficiency in the practice of computing.

Course Outcome (B.Sc. Computer Science)

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F.Y. B.Sc. Computer Science Course Outcomes

Class	Subject	Titl	COs: After successful completion of
	code	e	This course, student will be able to
F.Y.B.Sc	CS - 111	Problem Solving	CO 1: Explore algorithmic approaches to problem solving.
SemI		using Computer	CO 2: To teach basic principles of programming
		and 'C' Programmi ng	CO 3: To develop Problem Solving abilities using computers
			CO 4: Develop modular programs using control structures and arrays in 'C'.
	110	Database Management	CO 1: Solve real world problems using appropriate set, function, and relational models.
		System	CO 2: Design E-R Model for given requirements and convert the same into database tables.
			CO 3: Use SQL

Class	Subject	Titl	COs: After successful completion of
	code	e	This course, student will be able to
	CS - 113	Practical course on Problem Solving using Computer and 'C'	CO 1: Devise pseudocodes and flowchart for computational problems.
			CO 2: Write, debug and execute simple programs in 'C'.
		programming and Database	CO 3: Create database tables in postgreSQL.
		Management SystemS	CO 4: Write and execute simple, nested queries.
F.Y.B.Sc	CS - 121	Advanced 'C' Programmi	CO 1: To study advanced concepts of programming using the 'C' language.
SemII		ng	CO 2: To understand code organization with complex data types and structures.
			CO 3: To work with files.
			CO 4: To work with Preprocessors
	CS - 122	Relational Database Management Systems	CO 1: To teach fundamental concepts of RDBMS (PL/PgSQL)
			CO 2: To teach database management operations
			CO 3: Be familiar with the basic issues of
			transaction processing and concurrency control
			CO 1: Write debug and execute and its importance
	CS - 123	Course on	CO 1: Write, debug and execute programs using advanced features in 'C'.
		Advanced 'C' Programming and Relational Database Management	CO 2: Write programs using files.
			CO 3: To use SQL & PL/SQL.
			CO 4: To perform advanced database operations.
		Systems	

S.Y.B.Sc. Computer Science Course Outcomes

Class	Subject code	Title	COs: After successful completion of this course, student will be able to
S.Y.B.Sc. Sem I	CS - 231	Data Structures and Algorithms –	CO 1: To use well-organized data structures in solving various problems.
		I	CO 2: To differentiate the usage of various structures in problem solution.
			CO 3: Implementing algorithms to solve problems using appropriate data structures.
	CS - 232	Software Engineering	CO 1: Compare and chose a process model for a software project development.
		_	CO 2: Identify requirements analyze and prepare models.

			CO 3: Prepare the SRS, Design document, Project plan of a given software system.
	CS - 233	Practical Course Based on Data Structures and Algorithms I and Software	CO 1: Implementation of different data structures efficiently
			CO 2: Usage of well-organized data structures to handle large amount of data
		Engineering	CO 3: can prepare detailed statement of problem for the selected mini project
S.Y.B.Sc. Sem II	CS - 241	Data Structures and	CO 1: Implementation of different data structures efficiently
		Algorithms – II	CO 2: Usage of well-organized data structures to handle large amount of data
			CO 3: Usage of appropriate data structures for problem solving
	CS - 242	Computer Network	CO 1: Have a good understanding of the OSI and TCP/IP Reference Models and in particular have a good knowledge of Layers.
			CO 2: Understand the working of various protocols.
			CO 3: Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
	CS - 243 Practical Course Based on Data Structures and Algorithms II and Computer Networks I		CO 1: Usage of appropriate data structures for problem solving
			CO 2: can implement complex structures like
		CO 3: learns about network features	

Computer Science Course outcomes

Class	Subject code	Title	COs: After successful completion of this course, student will be able to
T.Y.B.Sc. Sem I	CS - 351	Operating Systems I	 CO 1: Processes and Thread Scheduling by operating system. CO 2: Synchronization in process and threads by operating system. CO 3: Memory management by operating system using with the help of various schemes.
	CS -	Computer Networks – II	CO 1: Student will understand the different protocols of Application layer.

352		CO 2: Develop understanding of technical aspect of Multimedia Systems
		CO 3: Develop various Multimedia Systems applicable in real time.
		CO 4: Identify information security goals.
		CO 5: Understand, compare and apply cryptographic techniques for data security.
CS - 353	Web Technologies	CO 1: Understand how to develop dynamic and interactive Web Page
	– I	CO 2: Design dynamic and interactive Web pages.
		CO 3: Learn Core-PHP, Server Side Scripting Language
		CO 4: Learn PHP-Database handling
CS - 354	Foundations of	CO 1: Perform Exploratory Data Analysis
	Data Science	CO 2: Obtain, clean/process, and transform data.
		CO 3: Detect and diagnose common data issues, such as missing values, special values, outliers, inconsistencies, and localization.
		CO 4: Demonstrate proficiency with statistical analysis of data.
		CO 5: Present results using data visualization techniques.
		CO 6: Prepare data for use with a variety of statistical methods and models and recognize how the quality of the data and the means of data collection may affect conclusions.
CS - 355	Object Oriented	CO 1: learn Object Oriented Programming language
	Programming using Java - I	CO 2: Understand the concept of classes, object, packages and Collections.
		CO 3: To design User Interface using Swing and AWT
		CO 4: To develop GUI based application.
256	Theoretical Computer	CO 1: Understand the use of automata during language design.
	Science	CO 2: Relate various automata and Languages.
20		CO 3: understand the relation between Automaton and Language
CS - 357	Practical	CO 1: Process synchronization
	course based on CS 351	CO 2: Processes and Thread Scheduling by operating system

			CO 3: Memory management by operating system using with the help of various schemes.
	CS - 358	Practical course based on CS 353 and CS 354	 CO 1: Understand how to develop dynamic and interactive Web Page CO 2:Prepare data for use with a variety of statistical methods and recognize how the quality of the data may affect conclusions. CO 3: Perform exploratory data analysis
	CS - 359	Practical Course based on CS 355	CO 1: Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs. CO 2: Read and make elementary modifications to Java programs that solve real-world problems. CO 3: Validate input in a Java program.
	CS - 3510	Python Programming	 CO 1: Develop logic for problem solving CO 2: Determine the methods to create and develop Python programs by utilizing the data CO 3: structures like lists, dictionaries, tuples and sets CO 4: To be familiar about the basic constructs of programming such as data, operations, conditions, loops, functions etc CO 5: To write python programs and develop a small application project
С	CS - 3511	Block chain Technology	CO 1: Learn the fundamentals of Blockchain Technology.CO 2: Learn Blockchain programmingCO 3: Basic knowledge of Smart Contracts and how they function.

T.Y.B.Sc. Computer Science Course outcomes

Class	Subje	Title	COs: After successful completion of
	ct	1100	This course, student will be able to
	code		This course, student will be uble to
T.Y.B.Sc. Sem II	CS - 361	Operating Systems II	CO 1: Management of deadlocks and File System by operating system CO 2: Scheduling storage or disk for processes CO 3: Distributed Operating System and its architecture and the extended features in mobile OS.
	CS - 362	Software Testing	 CO 1: To understand various software testing methods and strategies. CO 2: To understand a variety of software metrics, and identify defects and managing those defects for improvement in quality for given software. CO 3: To design test cases and test plans, review reports of testing for qualitative software.
	CS - 363	Web Technologies – II	 CO 4: To understand latest testing methods used in the software industries. CO 1: Learn different technologies used at client Side Scripting Language CO 2: Learn AJAX to make our application more dynamic
	GG 264		CO 3: Build dynamic website. CO 4: Using MVC based framework easy to design and handling the errors in dynamic website.
	CS - 364	Data Analytics	 CO 1: Use appropriate models of analysis, assess the quality of input, and derive insight from results. CO 2: Analyze data, choose relevant models and algorithms for respective applications CO 3: Understand different data mining techniques like classification, prediction, clustering and association rule mining CO 4: Apply modelling and data analysis techniques to the solution of real world business problems
	CS - 365	Object Oriented Programming using Java - II	 CO 1: To access open database through Java programs using Java Data Base Connectivity (JDBC) and develop the application. CO 1: Understand and Create dynamic web pages, using Servlets and JSP. CO 1: Work with basics of framework to

		develop secure web applications.
		CO 4: understand the concept of framework
CS –	C '1	•
366	Compiler Construction	CO 1: Understand the process of scanning and parsing of source code.
		CO 2: Learn the conversion code written in source language to machine language.
		CO 3: understand and design code generation and optimization techniques.
		CO 4: Understand tools like LEX and YACC.
CS - 367	Practical course based on CS 361	CO 1: Management of deadlocks by operating system
		CO 2: File System management
		CO 3: Disk space management and scheduling for processes
CS - 368	Practical course based on CS 363 and CS 364	CO 1: One PHP framework for effective design of web application.
		CO 2: Build dynamic website.
		CO 3: Using MVC based framework easy to design and handling the errors in dynamic website.
CS - 369	Practical Course based	CO 1: To Learn database Programming using Java
	on CS 365	CO 2: Understand and Create dynamic web pages using Servlets and JSP.
		CO 3: Work with basics of framework to develop secure web applications
CS - 3610	Software Testing Tools	CO 1: To understand various software testing methods and strategies.
		CO 2: To understand a variety of software metrics and identify defects and managing those defects for improvement in quality for given software.
		CO 3: To design test cases and test plans, review reports of testing for qualitative software.
		CO 4: To understand latest testing tools used in the software industries.
CS - 3611	Project	CO 1: Students will be able to practice acquired knowledge within the chosen area of technology for project development.
		CO 2: Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.
		CO 3: Work as an individual or in a team in development of technical projects.

Course Specific Outcome (M.Sc. Computer Science)

Class	Subject	Title	COs: After successful completion of this
	code		course, student will be able to
.Sc. Sem I	CSUT 111	Paradigm of Programmin g Language	CO 1: To Understand the basic language implementation techniques CO 2: Develop ability to learn new languages more quickly CO 3: To understand the concept of functional programming language CO 4: Develop ability to learn and write small
	CSUT 112	Design and Analysis of Algorithm	programs in different programming Languages CO 1: To design efficient algorithms using various algorithm designing strategies CO 2: To analyze the problem and develop the algorithms related to these problems CO 3: To classify the problem and apply the
			appropriate design strategy to develop algorithm CO 4: To design algorithm in context of space and time complexity and apply asymptotic notation
	113 Tec	Database Technologie s	CO 1: To study types of NoSQL databases (Document oriented, key Value pairs, Columnoriented and Graph)
			CO 2: To understand detailed architecture, define objects, load data, query data and performance tune NoSQL databases.
			CO 3: Able to handle large volumes of structured, semi-structured, and unstructured data using database technologies.
	111	Cloud computing	CO 1: To understand the principles and paradigm of Cloud Computing
			CO 2: Ability to design and deploy Cloud Infrastructure CO 3: Understand cloud security issues and solutions CO 4: Ability to understand role of Virtualization Technologies CO 5: Design & develop backup strategies for
	CSUP PPL and 115 Database Technolog s Practical	PPL and	CO 5: Design & develop backup strategies for cloud data based on features CO 1: Apply the knowledge of Scala to develop
		Database Technologie	web-based applications. CO 2: Provides knowledge of code optimization
		s Practical	CO 3: To understand concept of interoperability.

Class	Subject code	Title	COs: After successful completion of this course, student will be able to
			CO 4: Students are able to build and maintain the databases handling in real life applications and daily needs.
			CO 5: Able to perform hands-on NoSql database lab assignments that will allow students to use the four NoSQL database types via products such as Cassendra, MongoDB,Neo4J and Riak

Class	Subject	Title	COs: After successful completion of
	code		This course, student will be able to
M. Sc. Sem II	CSUT 121	Advanced Operating System	CO 1: To design and understand the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems.CO 2: To evaluate, and compare OS components
			through instrumentation for performance analysis.
			CO 3: To analyze the various device and resource management techniques for timesharing and distributed systems
			CO 4: To develop and analyze simple concurrent programs using transactional memory and message passing, and to understand the tradeoffs and implementation decisions.
		Mobile Technologi es	CO 1: To gain knowledge of installing Android Studio and Cross Platform Integrated Development Environment.
			CO 2: An ability to use the techniques, skills, and modern technology.
			CO 3: To develop the different applications that mobile computing offers to people, employees, and businesses
			CO 4: To develop high levels of technical competence in the field of mobile technology.
	CSUT 123	Software Project	CO 1: To identify the impact of IT projects on the performance of the organizations
		Manageme nt	CO 2: To understand, manage and develop IT infrastructure in different projects
			CO 3: To develop strategies to calculate risk factors involved in IT projects
			CO 4: To use project management software to control the design, implementation, closure, and evaluation of IT projects

Class	Subject	Title	COs: After successful completion of
	code		This course, student will be able to
			CO 5: To estimate, plan, calculate, and adjust project variables.
	CSUT 124	Project	CO 1: To demonstrate a depth of knowledge of modern technology.
			CO 2: To complete an independent research project, resulting in at least a thesis publication, and research outputs in terms of publications in high impact factor journals, conference proceedings, and patents.
			CO 3: Students will acquire the skills to communicate effectively and to present ideas clearly and coherently to specific audience in both the written and oral forms.
			CO 4: Students will be able to learn on their own, reflect on their learning and take appropriate actions to improve it.
	CSUT Practical on Advanced OS & Mobile Technologi es	Advanced OS &	CO 1: Student can understand internal structure and operations of OS along with various processes including threading, inter process communication and synchronization with I/O operations.
		_	CO 2: Awareness of computational issues, resources in distributed environment.
		CO 3: To develop mobile computing applications by analyzing their characteristics and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools.	
			CO 4: To understand how the underlying wireless and mobile communication networks work, their technical features, and what kinds of applications they can support.

HoD, Computer Sci

IQAC Coordinator



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Programme Specific Outcomes (PSO's)



Course Outcomes (CO's)

Syllabus: 2019 Pattern





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Programme Outcome (PO's), Programme Specific Outcome (PSO's), Course Outcome (CO's)

Department: Computer Science

Syllabus: 2019 Pattern

Programme and Courses:

Sr. No.	Name of the Programme	Year of introduction of programme	Duration of introduction of Programme
1	B. Sc. Comp. Sci.	1998-99	3 Years

Programme Specific Outcome (B.Sc. Computer Science)

Sr. No.	Programme Specific Outcome (B.S. Computer Science)
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PSO 5	Develop proficiency in the practice of computing.

Course Outcome (B.Sc. Computer Science)

F.Y. B.Sc. Computer Science Course Outcomes

Class	Subject	Title	COs: After successful completion of
	code		This course, student will be able to
F.Y.B.S c. (Annual Pattern)	CS - 101	Problem Solving Using Computers and 'C Programming	 CO 1: Explain about the basic concepts of program development statements and its syntax. CO 2: Explain the various types of arrays and its structure. CO 3: Discuss about the various types of Functions and String handling mechanisms. CO 4: Explain the Concepts of structures and Unions. CO 5: Illustrates the various operations performed on different types of files.
	CS - 102	File Organization and Fundamental of Databases	 CO 1: Describe the fundamentals of File processing and database processing system. CO 2: Explain the various data model and its application. CO 3: Explain the various normal forms and its role in DBMS. CO 4: Explain the fundamental concepts of SQL programs.

Class	Subject	Title	COs: After successful completion of
	code		This course, student will be able to
			CO 5: Describe the concepts of function, procedure, package, trigger and exception handling.
	CS - 103	Computer Science	CO 1: Explanation of design and algorithmic solution for a given problem.
		Practical Paper I	CO 2: Construction of flowchart for the computer programs.CO 3: Explains the program using Control
			Statements CO 4: Explains the program using Arrays and
	CS - 104	Computer Science Practical Paper I	Functions. CO 1: Understanding basic HTML designing
		Ţ	CO 2: Writing C programs using complex data structures such as pointers, structures etc.
			CO 3: Explain the program using file handling with structure.
S.Y.B.Sc. Sem I	CS-211	Data Structures using 'C'	CO 1: To use well-organized data structures in solving various problems.
			CO 2: To differentiate the usage of various structures in problem solution.CO 3: Implementing algorithms to solve problems
			using appropriate data structures.
	CS-212	Relational Database Management System	CO1: Students will understand the concept of transaction and transaction processing.
			CO2: To apply knowledge of Programming in pl/sql including stored function, cursor, trigger.
			CO3: Students will get to know how to apply DML/DDL commands on database.
			CO4: Acquaint the knowledge of recovery management.
S.Y.B.Sc.	CS-221	01:	CO5: Understanding the concept of client – server technology.
Sem II	CS-221	Object Oriented Concepts using C++	CO 1: Understand about the code reusability with the help of user defined functions.
			CO 2: Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.
			CO 3: Use the characteristics of an object-oriented programming language in a program.
	OC 222	C - £	CO 4: Use the basic object-oriented design principles in computer problem solving.
	CS-222	Software Engineering	CO 1: Understand the fundamental knowledge in software engineering
			CO 2: Understand to design a system, component, or process to meet desired needs within

Class	Subject	Title	COs: After successful completion of
	code		This course, student will be able to
			realistic constraints.
			CO 3: Describe the techniques, skills, and modern engineering tools.
			CO 4: Understand the early careers will be capable of team and organizational leadership in computing project settings, and have a broad understanding of ethical application of computing-based solutions to societal and organizational problems.
			CO 5: Discuss about analyze, design and manage the development of a computing-based system, component or process to meet desired needs within realistic constraints in one or more application domains.
	CS-223	Data structures Practicals and	CO 1: Find solutions to various problems by applying the algorithms of DS
		C++ Practicals	CO 2: Develop solutions for a range of problems using objects and classes.
			CO3: Programs to demonstrate the implementation of constructors, destructors and operator overloading.
			CO 4: Apply fundamental algorithmic problems including type casting, inheritance, and polymorphism.
			CO 5: Understand generic programming, templates, file handling.
	CS-224	Database Practicals & Mini Project	CO1: Students will get to know how to apply DML/DDL commands on database.
		using Software Engineering techniques	CO2: To apply knowledge of Programming in pl/sql including stored function, cursor, trigger
			CO3: Designing the normalized database.
			CO4: Understanding the practical knowledge of exception handling.
			CO5: Gathering data requirements and functional requirements
T.Y.B.Sc. Sem I	-	System Programming	CO 1: understand the design structure of a simple editor.
		. 0	CO 2: understand the design structure of Assembler and macro processor for an hypothetical simulated computer.
			CO 3: understand the working of linkers and loaders and other development utilities.
			CO 4: understand Complexity of Operating system as a software.
	CS- 332	Theoretical	CO 1: have an understanding of finite state and

Class	Subject	Title	COs: After successful completion of
	code		This course, student will be able to
		Computer	pushdown automata.
		Science	CO 2: have a knowledge of regular languages and context free languages.
			CO 3: To know the relation between regular language, context free language and corresponding recognizers.
			CO 4: To study the Turing machine and classes of problems.
	CS- 333	Computer Networks I	CO 1: Understand different types of networks, various topologies and application of networks.
			CO 2: Understand types of addresses, data communication.
			CO 3: Understand the concept of networking models, protocols, functionality of each layer.
			CO 4: Learn basic networking hardware and tools.
	CS- 334	Internet Programming -	CO 2: Learn Core-PHP, Server Side Scripting Language
		I	CO 3: Learn PHP-Database handling.
		Programming In Java I	CO 1: To learn Object Oriented Programming language
			CO 2: To handle abnormal termination of a program using exception handling
			CO 3: To create flat files
			CO 4: To design User Interface using Swing and AWT
	CS- 336	Object Oriented Software Engineering	CO 1: Understanding importance of Object Orientation in Software engineering
			CO 2: Understand the components of Unified Modeling Language
			CO 3: Understand techniques and diagrams related to structural modeling
			CO 4: Understand techniques and diagrams related to behavioral modeling
	GG 244		CO 5: Understand techniques of Object Oriented analysis, design and testing
T.Y.B.Sc. Sem II	CS- 341	Operating System	CO 1: understand design issues related to process management and various related algorithms
			CO 2: understand design issues related to memory management and various related algorithms
			CO 3: understand design issues related to File
	CS- 342	Compiler	management and various related algorithms CO 1: To understand design issues of a lexical
	CS- 342	Compiler Construction	analyzer and use of Lex tool
			CO 2: To understand design issues of a parser and
			use of Yacc tool

Class	Subject code	Title	COs: After successful completion of This course, student will be able to
	Couc		CO 3: To understand issues related to memory allocation
			CO 4: To understand and design code generation schemes
	CS- 343	Computer	CO 1: Basic networking concepts.
		Networks II	CO 2: Understand wired and wireless networks, its types, functionality of layer.
			CO 3: Understand importance of network security and cryptography.
	CS- 344	Internet Programming - II	CO 1: Learn different technologies used at client Side Scripting Language
		11	CO 2: Learn XML,CSS and XML parsers.
			CO 3: One PHP framework for effective design of web application.
			CO 4: Learn JavaScript to program the behavior of web pages.
			CO 5: Learn AJAX to make our application more dynamic.
	CS- 345	CS- 345	CO 1: To learn database programming using Java
		Programming In Java II	CO 2: To study web development concept using Servlet and JSP
			CO 3: To develop a game application using multithreading
	~~ ^ ^ ^ . . .	~	CO 4: To learn socket programming concept
	CS- 346	Computer Graphics	CO 1: To study how graphics objects are represented in Computer
			CO 2: To study how graphics system in a computer supports presentation of graphics information
			CO 3: To study how interaction is handled in a graphics system
			CO 4: To study how to manipulate graphics object by applying different transformations
			CO 5: To provide the programmer's perspective of working of computer graphics
	CS- 347	Practical Course Based on System Programming and OS	CO 1: Design and implement System programs with minimal features to understand their complexity.
			CO 2: Design and implement simulations of operating system level procedures.
	CS- 348	Practical Course Based	CO 1: Explain the programming language design, syntax and semantics.
	_	on Programming in Java I & II	CO 2: Describe the critical thinking skills through solving programming problems.CO 3: Explain the standard syntax for java

Class	Subject	Title	COs: After successful completion of
	CS- 349	Practical Course Based on Internet Programming I & II and Project	This course, student will be able to programs and other programming Tools. CO 4: Describe the animation and events based advanced java program concepts (Applet) CO 5: Explain the java programs using object oriented class with parameters, constructors, utility, calculations, and methods including inheritance, test classes and exception handling. CO 1:Implement Simple PHP programs to solve simple problems CO 2:Prepare detailed statement of problem for the selected mini project CO 3: Identify suitable process model for the same. CO 4: Develop Software Requirement Specification for the project. CO 5: Identify scenarios and develop UML Use case

HoD, Computer Science

IQAC Coordinator



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