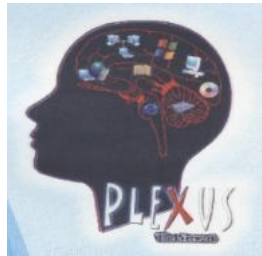


Nallamuthu Gounder Mahalingam College (Autonomous)
Re-Accredited by NAAC & ISO 9001:2015 Certified
Institution

Pollachi-642001



Department of BCA



SYLLABUS

(Effective for 2023–2026 Batch and onwards)

B.Sc. / B.Com.– For Computer Science / Commerce Cluster**(FOR THE CANDIDATES ADMITTED FROM THE ACADEMIC YEAR 2023 - 2024 ONWARDS)****I to VI SEMESTERS****SCHEME OF EXAMINATIONS**

SEMESTER - I										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs. / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	23UTL1C1	Tamil Paper-I	5	-	-	3	25	75	100	3
	23UHN1C1	Hindi Paper-I								
	23UFR1C1	French Paper-I								
II	23UEN101 / 23UEN102	Communication Skills – I (Level I) / Communication Skills – I (Level II)	5	-	-	3	25	75	100	3
III	23UBC101	CC I :Programming In C	5			3	25	75	100	4
	223UBC102	CC II :Data Structures	4			3	25	75	100	4
	23UBC1A1/ 23UBC1A2	GE I – Allied: Mathematics I- Computer Oriented Numerical And Statistical Methods / Discrete Mathematics - I	5			3	25	75	100	4
	23UBC103	CC Lab -I: Programming In C		4		3	20	30	50	2
IV		AECC I: Environmental Studies	1	-	-	-	-	-	-	-
	23HEC101	Human Excellence - Personal Values & SKY Yoga Practice - I	1	-	-	2	20	30	50	1
V		Extension Activities – Annexure I	-	-	-	-	-	-	-	-
EC		Online Course (Optional) (MOOC / NPTEL / SWAYAM)								Grade
Total			30						600	21

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; AECC - Ability Enhancement Compulsory Course

SEMESTER - II										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs. / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	23UTL2C2	Tamil Paper-II	5	-	-	3	25	75	100	3
	23UHN2C2	Hindi Paper-II								
	23UFR2C2	French Paper-II								
II	23UEN202 / 23UEN203	Communication Skills – II (Level I) / Communication Skills – II (Level II)	5	-	-	3	25	75	100	3
III	23UBC204	CC III :Object Oriented Programming With C++	4			3	25	75	100	4
	23UBC205	CC IV :Core-IV: Digital Computer Fundamentals	4			3	25	75	100	4
	23UBC2A1/ 23UBC2A2	GE II - Allied :Mathematics II– Mathematical Foundations Of Computer Applications / Discrete Mathematics - II	4			3	25	75	100	4
	23UBC206	CC Lab - II : Programming In C++		4		3	20	30	50	2
	23UBC2S1/ 23UEL2S2	SEC I: Naan Mudhalvan : Data science Foundation / Profession Skills		2		3	20	30	50	2
IV	23EVS201	AECC I: Environmental Studies	1			2	-	50	50	2
	23HEC202	Human Excellence - Family Values & SKY Yoga Practice - II	1			2	20	30	50	1
V		Extension Activities - Annexure I	-	-	-	-	-	-	-	-
EC	23CMM201	Manaiyiyal Mahathuvam - I			15 Hrs.	2	-	50	50	Grade
	23CUB201	Uzhavu Bharatham - I			15 Hrs.	2	-	50	50	Grade
		Online Course (Optional) (MOOC / NPTEL / SWAYAM)								Grade
Total			30						700	25

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; AECC - Ability Enhancement Compulsory Course;

SEC – Skill Enhancement Course

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	23UBC101			Title	Batch:	2023-2026	
				CC I : Programming In C	Semester:	I	
Lecture Hrs./Week	5	Tutorial Hrs./Sem.	5		Credits:	4	

Course Objective

To provide a student with a thorough grounding in the basics of a Subject and make them to learn the fundamental programming concepts and methodologies which are essential to build good C programs. To develop programming skills in order to meet the day to day IT demands.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Tell the basic terminology used in computer programming	K1
CO2	Understand and debug programs in C language.	K2
CO3	Inference programming concepts such as Arrays, Functions and Structures	K3
CO4	Analyze the dynamics of memory by the use of pointers and Structures.	K4
CO5	Design different data structures and create/ update basic data files.	K5

Mapping

PO\PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	H	H	M	M	M	H	H	H
CO2	H	H	M	H	H	H	M	H	M	M	H	H

CO3	H	H	M	H	H	H	M	M	H	H	H	H
CO4	H	H	M	H	H	H	M	M	M	M	H	H
CO5	H	H	M	H	H	H	M	M	M	M	H	H

23UBC101

Units	Content	Hrs
UnitI	Overview of C-Introduction-Importance of C-Basic Structure of C Program-Character Set- Tokens-Keywords and Identifiers-Constants-Variables - Data Types-Declaration of Variables-Assigning Values to Variables-Defining Symbolic Constants-Operations & Expressions-Arithmetic Operators-Relational – Logical-Assignment- Increment & Decrement- Conditional Operator-Bitwise and Special Operator-Arithmetic Expressions-Evaluation of Expressions-Precedence of Arithmetic Operators- Type Conversions in Expressions -Operator Precedence and Associativity-Mathematical Functions.	15
UnitII	Managing I/O operations - Reading a character - Writing a Character - Formatted Input - Formatted Output - Decision Making and Branching - Decision Making with IF Statement-Simple IF Statement - IF...ELSE - Nesting of IF...ELSE Statements - ELSE...IF LADDER - Switch Statement - ?: - GOTO Statement - Decision Making and Looping -WHILE Statement-DO Statement-FOR Statement - JUMP IN LOOPS.	15
UnitIII	Arrays-One Dimensional Array-Two Dimensional Arrays-Initializing Two Dimensional Arrays-Multi Dimensional Arrays-Handling of Character Strings-Declaring and Initializing String Variables- Reading Strings from terminal-Writing Strings to Screen-Arithmetic Operations on Characters-Putting Strings Together-Comparison of Two strings- String Handling Functions -Table of Strings-User Defined Functions-Need for User Defined Functions-Form of C Functions-Return Values and their Types-Calling a Function-Category of Functions-No Arguments and No	15

	Return Types-Argument but No Return Types-Arguments with Return Values-Handling of Non-Integer-Functions- Nesting of Functions-Recursion-Function with Arrays- <i>Scope and Life Time of Variables in Functions.</i>	
UnitIV	Structures and Unions-Structure Definition-Giving Values to members-Structure Initialization- Comparison of Structure Variables-Arrays of Structures-Arrays with Structures - Structures and Functions -Unions-Size of Structures-Bitwise Fields-Pointers-Understanding Pointers-Accessing the Address of Variables-Declaring and Initializing Pointers-Increments and Scale Factor-Pointer and Arrays-Pointer and Character Strings- Pointers and Functions- Pointers and Structures-Points on Pointers.	15
UnitV	File Management in C-Defining and Opening a File-Closing a File-I/O Operation on Files- Error Handling during I/O Operations -Random Access Files-File Inclusion- <i>Compiler Control Directives.</i>	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalkandtalk, Quiz, Assignments, Group Task.

TextBook

S.NO	AUTHOR	TITLEOFTHE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Programming inANSIC(Unit 1 to 5)	Tata McGraw-Hill publications,Fourth Edition	2007

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Yashavant Kanetkar,	Let Us C	BPB Publications, 8 th Edition	2004
2	Yashavant Kanetkar	Test Your C Skills	BPB Publications, Second Edition	2009

ProgrammeCode:	BCA			ProgrammeTitle:	Bachelor of Computer Applications	
CourseCode:	23UBC102			Title	Batch:	2023-2026
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	5	CC II : Data Structures	Semester:	I
					Credits:	04

Course Objective

The course is designed for understanding the basic concepts, terminologies in data structures. To enthuse students knowledge on computer algorithms and able to develop efficient program.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remembering the concepts to use linear and non-linear data structures Like stacks, queues, linked list etc.	K1
CO2	Understand and analyze to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures	K2
CO3	Enhance the knowledge to solve problems like sorting, searching, Insertion and deletion of data Operations.	K3
CO4	Analyze the concepts of trees, graphs and its applications.	K4
CO5	Evaluate to learn a number of algorithm design techniques and to Analyze the efficiency and the accuracy of algorithms.	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	M	M	H	M	M	H	L	L	M	H	H	M
CO2	H	H	H	M	H	M	M	L	M	H	H	M
CO3	H	H	H	L	H	H	M	M	M	H	H	H

CO4	H	H	H	H	H	H	M	M	M	H	H	H
CO5	H	H	M	M	H	H	M	M	M	H	H	H

Units	Content	Hrs
UnitI	Introduction- Linear data structures: Arrays-Representation of Array- Operations of Array- Stacks - Queues . Linked Lists-Types of Linked Lists- Linked List Operations- Linked Stacks and Queues.	12
UnitII	Trees - Definitions and Concepts- Binary Trees – Representations-Operations- Traversals: Inorder-Preorder-Post order- Threaded BinaryTrees - BinarySearch Trees.	12
UnitIII	GRAPHS-Terminology –Representations: Adjacency Matrix- Adjacency Lists - Adjacency Multi lists - Depth First Search-Breadth First Search -Shortest paths Dijkstra algorithm- <i>Minimum spanning Tree</i> - Kruskal's Algorithm & Prim's Algorithm.	12
UnitIV	Basic Steps- Greedy method- The traveling salesperson problem - Knapsack problem- Job Scheduling Problem- Backtracking- Divide and conquer Algorithms-The 8 Queens problem-Sum of subsets.	12
UnitV	Sorting Techniques: Insertion sort –Mergesort–Quicksort–Heapsort. Searching-Searching Techniques: Linear search –Binary Search.	12
	Total Contact Hrs	60

- The topics given in **Italics** are noted as Self-Study topics.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Elliz Horowitz, Sartaj Sahani	Fundamentals of Data Structures, (Unit 1, 2&3).	Galgotia Publishers	1984
2	Elliz Horowitz, Sartaj Sahani, Sanguthevar Rajasekaran,	Fundamentals of Computer Algorithms, (Unit 4&5).	Galgotia Publishers,	2008

23UBC102**Reference Books**

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Seymour Lipschutz	Data Structures	Mc-Graw-Hill, Indian Adapted Edition	2006
2	Jean-Paul Trembly, Paul G. Sorenson	An Introduction to data structures with application	Mc-Graw-Hill, Second Edition	1991

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	23UBC1A1			Title	Batch:	2023-2026
				GE I – Allied : Mathematics I- Computer Oriented Numerical and Statistical Methods	Semester:	I
Lecture Hrs./Week	5	Tutorial Hrs./Sem	5		Credits:	04

Course Objective

This course provides an introduction to the basic concepts and techniques of numerical solution of algebraic equation, system of algebraic equation, numerical solution of differentiation, integration. It also delivers knowledge of various significant and fundamental concepts to inculcate an adequate understanding of the application of Statistical Methods.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall numerical methods to find out the solution of algebraic equations using different methods like Bisection method, Newton Raphson method under different conditions and numerical solution of system of Algebraic equations.	K1
CO2	Understand the properties of Correlation, Regression and compute Karl-Pearson's coefficient of correlation.	K2
CO3	Apply numerical differentiation and Integration whenever and wherever routine methods are not applicable and understand the importance of Interpolation and its application to solve problems for equal intervals and Unequal intervals.	K3
CO4	Analyze the system of linear equations by applying different methodologies.	K4
CO5	Compute and interpret the result so Regression and Correlation Analysis.	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	H		M	H					M	
CO2	H	L			H	M				M	H	M
CO3	H	M	H		H	H				M	H	M
CO4	H	M	H		M	M				M	M	
CO5	H	L			M	M				M	M	

Units	Content	Hrs
Unit I	Introduction - Bisection Method – Method of Successive Approximations or the Iteration Method- Method of False Position- Newton Raphson Method – Horner's Method	15
Unit II	System of Linear Algebraic Equations- Gauss Elimination - Inverse of Matrix using Gauss Elimination- Gauss Jordan – Triangularization- Gauss Jacobi and Gauss Seidal Method.	15
Unit III	Interpolation and Approximation – Newton, Lagrange's Method - Numerical Differentiation and Integration- Method's Based on Interpolation-Trapezoidal Rule- <i>Simpson's 1/3 and 3/8th rule.</i>	15
Unit IV	Correlation Analysis-Meaning-Types- Degrees of Correlation -Scatter Diagram- Correlation Graph-Karl Pearson's Coefficient of Correlation- Rank Correlation- Coefficient of Concurrent Deviations-Methods of Least Squares.	15
Unit V	Regression Analysis-Meaning- <i>Types of Regression</i> –Regression Equations- Regression Equations from Mean- Regression Coefficients -Properties of Regression Coefficients-Correlation and Regression, a Comparison.	15
	Total Contact Hrs	75

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Books**23UBC1A1**

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	P.Kandasamy, K.Thilagavathy, K.Gunavathi	Numerical Methods (Unit 1,2,3)	S.Chand & Company Ltd, First Edition	1999
2	S.P.Gupta	Statistical Methods (Unit 4, 5).	Sultana Chand & Sons, Thirty-Fourth Edition	2004

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Mark L. Crossley	The Desk Reference of Statistical Quality Methods	American Society for Quality, Quality Press, Second Edition	2008
2	Rao V.Dukkipati	Numerical Methods	New Age International, First Edition	2010

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	23UBC1A2			Title	Batch:	2023-2026
				GE I – Allied: DISCRETE MATHEMATICS - I	Semester:	I
Lecture Hrs./Week	5	Tutorial Hrs./Sem	5		Credits:	04

Course Objective

Understand sets and perform operations and algebra on sets. Determine properties of relations identify equivalence and partial order relations, sketch relations. Identify functions and determine their properties. Define graphs, digraphs and trees, and identify their main properties.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Ability to apply mathematical logic to solve Problems.	K1
CO2	Understand sets, relations, functions and discrete structures	K2
CO3	Able to use logical notations to define and reason about fundamental mathematical concepts such as sets relations and functions	K3
CO4	Able to formulate problems and solve recurrence relations	K4
CO5	Able to model and solve real world problems using graphs and trees	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	H		M	H					M	

CO2	H	L			H	M				M	H	M
CO3	H	M	H		H	H				M	H	M
CO4	H	M	H		M	M				M	M	
CO5	H	L			M	M				M	M	

Units	Content	Hrs
UnitI	Fundamental and Mathematics Logic Fundamental- Sets and Subsets- Operations on Sets-Sequences- Properties of Integers- Matrices. Logic- Proposition and Logical Operations- Conditional Statements- Methods of Proof- Mathematical Induction. Mathematical Logic- Statements and Notation, Connectives, Normal Forms.	15
UnitII	The Theory of Inference for the Statement Calculus - The Predicate Calculus, Inference Theory of the Predicate Calculus. Counting- Relation and Diagraph, Function Counting- Permutations- Combinations - The Pigeonhole Principle, Recurrences Relations.	15
UnitIII	Relations and Digraphs- Product Sets and Partitions, Relations and Digraphs, Paths in Relations and Digraphs- Properties of Relations, Equivalence Relations, Manipulation of Relations- Transitive Closure and Wars Hall's Algorithm. Functions- Definition and Introduction - Function for Computer Science, Permutation Functions.	15
UnitIV	Graph Theory- Boolean and Tree - Graph Theory- Basic Concept of Graph Theory- Euler Paths and Circuits- Hamiltonian Paths and Circuits- Other Relations and Structure- Partially Ordered Sets- Lattices- Finite Boolean Algebras- Functions of Boolean Algebras- Boolean Functions As Boolean Polynomials.	15
UnitV	Semi Group and Groups Semi Group and Groups- Binary Operations Revisited Semi Groups- Products and Quotients of Semi Groups- Groups- Products and Quotients of Groups. Introduction to Computability Theory- Languages- Finite-State Machines, Semi Groups- Machines and Languages.	15
	Total Contact Hrs	75

The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, PowerPoint Presentation, Chalk and talk, Quiz, Assignments, Group Task.
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TextBooks**23UBC1A2**

S.NO	AUTHOR	TITLEOF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	J.P. Tremblay and R. Manohar,	“Discrete Mathematical Structure with Applications to computer Science”, Unit 1, 2,3).	Tata McGraw-Hill , First Edition	2005
2	Bernard Kolman, Robert C. Busby and Sharon Ross,	“Discrete Mathematical Structure”, (Unit 4, 5).	Tata McGraw-Hill , First Edition	2005

ReferenceBooks

S.NO	AUTHOR	TITLEOF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Kenneth H. Rosen	Discrete Mathematics and its Applications	McGraw Hill education (India) Private Limited. 7th Edition	2008
2	C. L. Liu and D. P. Mohapatra	Elements of Discrete Mathematics	4th edition, McGraw Hill education (India) Private Limited.	2010

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	23UBC103			Title	Batch:	2023-2026
Practical Hrs./Week	4	Tutorial Hrs./Sem.		CC Lab -I: Programming In C	Semester:	I
					Credits:	2

Course Objective

To practice the fundamental programming methodologies in the C programming language via laboratory experiences. To code, document, test, and implement a well-structured, robust computer program using the C programming language. To prepare students to face the challenges and opportunities in the IT industry by building strong foundations in C programming language.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the structure and significance of the C Programming Language.	K1
CO2	Acquire the knowledge about C Programming for various programming technologies.	K2
CO3	Role of constants, variables, identifiers, operators, type conversion and Other building blocks of C Language.	K3
CO4	Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.	K4
CO5	Role of Functions involving the idea of modularity.	K5

Mapping

PO\ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	H		M				M	L	H	M
CO2	H	H	H		H	H	M	H	H	H	H	M
CO3	H	H	M	H	H	H	H	H	H	H	H	H
CO4	H	H	M	H	H	H	H	H	H	H	H	H
CO5	H	H	M	H	H	H	H	H	H	H	H	H

23UBC103

1. Write a C program to check to whether the given number is Armstrong number or not.
2. Write a C program to find whether the given number is prime or not.
3. Write a C program to check the greatest among three numbers using the conditional operator.
4. Write a C program to generate the Fibonacci series for the given number.
5. Write a C program to find the addition of matrix.
6. Write a C program to find the matrix multiplication of the given number.
7. Write a C program to display the transpose of a Matrix.
8. Write a C program to find the given string is palindrome or not.
9. Write a C program to count the number of words, characters and lines in a given text.
10. Write a C program using types of functions for the arithmetic operations.
11. Write a C program to calculate the factorial value for the given number using recursion.
12. Write a C program to process a student detail using structures.
13. Write a C program to add the arrays using pointers.
14. Write a C program to create a student file with regno, name, mark1, mark2.
15. Write a C program to create and process an employee file.

Total Contact Hrs 60

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	23UBC204			Title	Batch:	2023-2026
				CC III :Object Oriented Programming With C++	Semester:	II
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	5		Credits:	4

Course Objective

To develop a greater understanding of the issues involved in programming language design and implementation. To develop an in-depth understanding of functional, logic and object-oriented programming paradigms. To implement several programs in languages other than the one emphasized in the core curriculum. To understand design/implementation issues involved with variable allocation and binding, control flow, types, subroutines, parameter passing. To train them to meet day-to-day demands of IT industry.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Gain the basic knowledge on Object Oriented concepts.	K1
CO2	Ability to demonstrate applications using Object Oriented Programming Concepts	K2
CO3	Develop the differences between traditional imperative design and object-oriented Design	K3
CO4	Examine class structures as fundamental, modular building blocks	K4
CO5	Explain the role of inheritance, polymorphism, dynamic binding and Generic structures in building reusable code.	K5

Mapping

PO PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	M	H	H	H	M	H	M	H	H	H
CO2	H	H	M	H	H	H	M	H	H	H	H	H
CO3	H	H	M	H	H	H	H	H	H	H	H	H
CO4	H	H	M	H	H	M	L	H	M	H	H	H
CO5	H	H	M	H	H	M	L	H	M	H	H	H

23UBC204

Units	Content	Hrs
UnitI	Procedure Oriented Programming-Object Oriented Programming Paradigm- Basic Concepts of Object -Oriented Programming-Benefits of OOP-Object Oriented Languages-Applications of OOP-Steps in Object Oriented Analysis-Steps in Object Oriented Design.	12
UnitII	Tokens-Keywods-Identifiers and Constants-Data Types-Reference Variables- Operators in C++ - Scope Resolution Operator-Member Dereferencing Operator-Memory Management Operators-Manipulators-Type Cast Operators-Expression and Their Types- Control Structures.	12
UnitIII	Functions: Function Prototype-Call By Reference-Return ByReference-Inline Functions-Default and Constant Arguments-Function Overloading-Friend andVirtual Functions-Classes andObjects- Constructors and Destructors.	12
UnitIV	OperatorOverloading-Inheritance-Pointers- Virtual Functionsand Polymorphism.	12
UnitV	Managing Console Input / Output operations: C++ Streams-C++ Stream Classes-Formatted and Unformatted I/O Operations-Managing Output Manipulations-Working Files.	12
	Total Contact Hrs	60

Pedagogy and Assessment Methods:

Seminar,Power Point Presentation,Chalk and talk, Quiz,Assignments,GroupTask.
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Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Object Oriented Programming with C++ (Unit 1 to 5)	Tata McGraw-Hill Education, Fourth Edition	2008

Reference Books

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	C.Ravichandran	Programming in C++	Tata McGraw Hill Publications, Fourteenth Edition	2001
2	K.RVenugopal, Rajkumar Buyya	Mastering C++	Tata McGraw-Hill Education	2017

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	23UBC205			Title	Batch:	2023-2026
				CC IV : Digital Computer Fundamentals	Semester:	II
Lecture Hrs./Week	4	Tutorial Hrs./Sem			Credits:	04

Course Objective

To provide a comprehensive introduction to digital logic design leading to the ability to understand the principles, methods and applications of digital computer organization and design.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember how to represent numbers in computers and use problem solving techniques such as flowcharts.	K1
CO2	Acquire knowledge about Boolean algebra and analyze IC digital logic Families.	K2
CO3	Compare various combinational logic circuits.	K3
CO4	Analyze various sequential circuits such as flip-flops, counters and registers.	K4
CO5	Evaluate various components in designing the digital logic circuits.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	H	H		L	M	M		M			M	H
CO2	M	H				H			M		L	M
CO3		H				H	M					
CO4		H				H	M					
CO5	M	M		M	M	H	H	M	H	M	M	H

Units	Content	Hrs
Unit I	Flowchart and Number Systems: Logic and Flowcharting - Flowcharting- Flowcharting Symbols-Program Specification Analysis - Program Specification - Introduction- Input-Output - Throughput. Number system – Digital Computers and Digital Systems – Binary Numbers – Number Based Conversions – Octal and Hexadecimal Numbers – Complements – Binary Codes.	12
Unit II	Boolean Algebra: Boolean Algebra and Logic Gates-Basic Definition – Axiomatic Definition of Boolean Algebra – Basic Theorems and Properties of Boolean Algebra – Boolean Functions – Other Logic Operations – Digital Logic Gates – IC Digital Logic Families – Semi conductor Memory– Bipolar MDS – ROM – RAM – PROM – EPROM - Simplification using the Map method- Product of Sums.	12
Unit III	Combinational Logic: Introduction – Adders – Full Adder – Half Adder- Subtractor – Half Subtractor - Full Subtractor – Multilevel NAND circuits – Multilevel NOR Circuits – Binary Parallel Adder– Decimal Adder – <i>BCD Adder</i> – Decoders – Encoder – Multiplexers – De Multiplexers.	12
Unit IV	Introduction – Flip Flops – Triggers of Flip Flops – Flip Flops Excitation Table – Design Procedure – Design Counters – Registers, Counters and Memory Unit. Registers – Shift Registers – Ripple Counters – Synchronous Counters – Timing Sequence.	12
Unit V	Input-Output Devices: Punched Tape, Tape Readers – Punched Cards – Card Readers – Alphanumeric Codes – Character Recognition – MICR – OCR – Output Equipment - Printers – CRT Output Devices – Output Offline Operation – Error Detecting and Error Correcting Codes – Keyboards – Terminals – Floppy Disks – Magnetic tape – <i>Tape Cassettes & Cartridges</i> .	12
	Total Contact Hrs	60

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Morris Mano	Digital Logic and Computer Design	Prentice Hall Of India, Third Edition(Unit I to IV)	January 2004
2	J. Maynard	Computer Programming	International Edition (Unit V)	2014

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Donald P Leach, Albert Paul Malvino, Goutam Saha	Digital Principles and Applications	Tata McGraw-Hill, Sixth Edition	2006

Programme Code:	BC A			Programme Title:	Bachelor of Computer Applications	
Course Code:	23UBC2A1			Title	Batch:	2023-2026
Lecture Hrs./Week	4	Tutorial Hrs./Sem.		GE II - Allied: Mathematics II – Mathematical Foundations Of Computer Applications	Semester:	II
					Credits:	4

Course Objective

Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to use mathematically correct terminology and notation, to construct correct direct and indirect proofs, to use division into cases in a proof, to use counterexamples and to apply logical reasoning to solve a variety of problems.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Ability to define mathematical logic to solve problems.	K1
CO2	Understand sets, relations, functions and discrete structures.	K2
CO3	Able to use logical notations to discover and reason about fundamental mathematical concepts such as sets relations and functions.	K3
CO4	Able to examine problems and solve matrix.	K4
CO5	Able to evaluate and solve real world problems using graphs and probability.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M	M		H	H	H	L	M	M	H	H	H
CO2	M	M		H	H	M		M	M	H	M	H
CO3	M	M		H	H	H		M	M	H	M	H
CO4	M	H		H	H	M		M	M	H	M	H
CO5	M	H	H	H	H	H	L	M	H	H	H	H

Units	Content	Hrs
Unit I	Set Theory: Introduction - SET - Finite Set- Cardinality - SubSet-Equal Sets - Null Set (or) Empty Set- Singleton Set - Universal Set – Union –Intersection - Disjoint Sets – Difference Set-ComplementSet-Power Set-Principle of Inclusion and Exclusion-Ordered Pair-Cartesian Products-Partition of Set-MinSets-MaxSet.	12
Unit II	Functions: Introduction - Types of Functions - Classification of functions - Algebraic function - Transcendental function - Composition of functions(Simple Problems Only)- Identityfunction-Inverseofafunction(SimpleProblemsOnly) -Characteristic function of a Set (Properties only) - Hashing functions. Relations: Binary Relation - Complementary Relation - Inverse Relation-Unionand Intersection of two relations - SymmetricRelation-Anti-SymmetricRelation- ReflexiveRelation-Transitive Relation-Equivalence Relation (Simple Problems only).	12
Unit III	Graph Theory: Graph: Undirected Graph -Directed Graph -Multi Graph - PseudoGraph - Simple Graph - General Graph - Degree of Vertex - Finite Graph -Order of a Graph - Size of a Graph - Null Graph - Isolated Graph - Regular Graph - Isomorphic Graphs (Simple Problems Only). Matrix Representation of Graphs: Adjacency Matrices-IncidenceMatrix-Sub Graph-Euler Graph-Hamiltonian Graph (SimpleProblemsOnly).	12
Unit IV	Matrices: Introduction - Definition - Rank of a Matrix - Elementary Transformations-Solution of a System of linear equations (Simple Problems Only). EigenvaluesandEigenVectors-Singular and Non SingularMatrix–Inverse (or reciprocal) of a SquareMatrix– Adjoint of a Square Matrix (Simple Problems Only).	12
Unit V	Discrete Probability : Introduction - Sample space – Event - Exhaustive event - Favorable event - Mutually exclusive events - Equally likely events – Independent events – Probability -Axioms of probability - Extension of general law of addition of probabilities - Conditional Probability - Multiplication law of Probability – Multiplication law of Probability for independent events - <i>Extension of multiplication law of probability</i> - Total Probability- Baye's theorem (Simple Problems only).	12
	Total Contact Hrs	60

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

23UBC2A2**Text Book**

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	P.Geetha	Discrete Mathematics (Unit 1 to 4)	Scitech Publications (india) pvt. Ltd., chennai	2011
2	Dr.M.K.Venkata raman, Dr.N.Sridharan,	Discrete Mathematics I CS (Unit 5)	National Publishing Company, First Edition	2000

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Ralph P. Grimaldi	Discrete and Combinatorial Mathematics - An applied introduction,	Fifth Edition, Addison Wesley Publishing Company	2006
2	Tremblay J. and Manohar R,	Discrete Mathematical Structures with Applications to Computer Science	Tata McGraw Hill	2001

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	23UBC2A2			Title	Batch:	2023-2026
Lecture Hrs./Week	4	Tutorial Hrs./Sem.		GE II-Allied: Mathematics II – Discrete Mathematics - II	Semester:	II
					Credits:	4

Course Objective

Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to use mathematically correct terminology and notation, to construct correct direct and indirect proofs, to use division into cases in a proof, to use counterexamples and to apply logical reasoning to solve a variety of problems.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Ability to define mathematical logic to solve problems.	K1
CO2	Understand sets, relations, functions and discrete structures.	K2
CO3	Able to use logical notations to discover and reason about fundamental mathematical concepts such as sets relations and functions.	K3
CO4	Able to examine problems and solve matrix.	K4
CO5	Able to evaluate and solve real world problems using graphs and probability.	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M	M		H	H	H	L	M	M	H	H	H
CO2	M	M		H	H	M		M	M	H	M	H
CO3	M	M		H	H	H		M	M	H	M	H
CO4	M	H		H	H	M		M	M	H	M	H
CO5	M	H	H	H	H	H	L	M	H	H	H	H

Units	Content	Hrs
Unit I	Set theory-Introduction-Set & its Elements-Set Description-Types of sets- Venn-Euler Diagrams- Set operations & Laws of set theory-Fundamental products-partitions of sets-minsets- Algebra of sets and Duality-Inclusion and Exclusion principle.	12
Unit II	Mathematical logic – Introduction- propositional calculus –Basic logical operations- Tautologies-Contradiction-Argument-Method of proof- Predicate calculus.	12
Unit III	Relations – Binary Relations – Set operation on relations-Types of Relations – Partial order relation – Equivalence relation – Composition of relations – Functions – Types of functions – Invertible functions – Composition of functions.	12
Unit IV	Graph Theory – Basic terminology – paths, cycle & Connectivity – Sub Graphs – Types of graphs – Representation of graphs in compute memory - Trees – Properties of trees – Binary trees – traversing Binary trees – Computer Representation of general trees.	12
Unit V	Event - Exhaustive event - Favorable event - Mutually exclusive events - Equally likely events – Independent events – Probability - Axioms of probability - Extension of general law of addition of probabilities - Conditional Probability.	12
	TotalContactHrs	60

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation,Chalk and talk,Quiz, Assignments,GroupTask.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	J. P Tremblay R Manohar	Discrete Mathematics Structures with Applications to computer science- (Unit 1 to 4)	Mc Graw Hill International Edition	2011
2	Dr.M.K.Venkata raman, Dr.N.Sridharan,	Discrete Mathematics (Unit 5)	National Publishing Company,First Edition	2000

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Dr M. K. Venketaramen, Dr N.Sridharan, N.Chandarasekaran	Discrete Mathematics	Fifth Edition, The National publishing Company Chennai.	2006
2	TremblayJ.Pand Manohar R,	Discrete Mathematical Structures with Applications to Computer Science	TataMcGrawHill	2001

ProgrammeCode:	BCA			ProgrammeTitle:	Bachelor of Computer Applications	
CourseCode:	23UBC206			Title	Batch:	2023–2026
Practical Hrs./Week	4	Tutorial Hrs./Sem.		CC Lab - II : Programming In C++	Semester:	II
					Credits:	2

Course Objective

To provide in-depth coverage of object oriented programming principles and techniques using C++. Topics include classes, overloading, data abstraction, information hiding, encapsulation, inheritance, polymorphism, file processing, templates, exceptions, container classes, and low-level language features. To develop competent technical writing skills using C++ programming so as to enable the graduate to meet the requirement.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the structure and significance of the C++ Programming Language.	K1
CO2	Acquire the knowledge about C++ Programming for various programming technologies.	K2
CO3	Demonstrate the ability to analyze, use and create functions, classes, to overload operators.	K3
CO4	Demonstrate the ability to understand and use inheritance and Pointers when creating or using classes and create templates.	K4
CO5	Demonstrate the ability to understand and use Exception handling and file handling mechanism.	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	H	M	H		M				M	L	H	M
CO2	H	H	H		H	H	M	H	H	H	H	M
CO3	H	H	M	H	H	H	H	H	H	H	H	H
CO4	H	H	M	H	H	H	H	H	H	H	H	H
CO5	H	H	M	H	H	H	H	H	H	H	H	H

1. Write a program in C++ to exchange the content of two variables using call by reference.
2. Write a program in C++ to create the class shape, and overload the function to return the perimeters of the different shapes.
3. Write a program in C++ to sort the integer array.
4. Write a program in C++ to demonstrate constructor with default argument.
5. Write a program in C++ to demonstrate destructor in inheritance.
6. Write a program in C++ to change the sign value of the inputs by using over loaded unary operator.
7. Write a program in C++ to demonstrate binary operator for the matrix class.
8. Write a program in C++ to demonstrate multiple inheritance.
9. Write a program in C++ to copy the content of file into another.
10. Write a program in C++ to append the content of the file.
11. Write a program in C++ to create a file.
12. Write a program in C++ to demonstrate virtual function.
13. Write a program in C++ to demonstrate friend function.
14. Write a program in C++ to implement Class Matrix that adds, subtracts and initializes the matrix.
15. Write a program in C++ to create a random access file, add a new record to the file, modifies the details of a record and displays the contents of the file.

Total Contact Hrs: 60

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	23UBC2S1			Title	Batch:	2023–2026
				SEC I: Naan Mudhalvan : Data science Foundation	Semester:	II
Practical Hrs./Week	2	Tutorial Hrs./Sem.			Credits:	2

Course Objective

To provide in-depth coverage of Data science programming principles and techniques. Topics include arrays; data frames and Variability. To develop competent technical writing skills using Data science programming so as to enable the graduate to meet the requirement.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the structure and significance of the Data science programming Language.	K1
CO2	Acquire the knowledge about Data science Programming for various programming technologies.	K2
CO3	Demonstrate the ability to analyze, use and operators.	K3
CO4	Demonstrate the ability to understand and use Numpy arrays and Pandas data frames	K4
CO5	Demonstrate the ability to understand and use Correlation and scatter plots.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	H	M	H		M				M	L	H	M
CO2	H	H	H		H	H	M	H	H	H	H	M
CO3	H	H	M	H	H	H	H	H	H	H	H	H
CO4	H	H	M	H	H	H	H	H	H	H	H	H
CO5	H	H	M	H	H	H	H	H	H	H	H	H

1. Working with Numpy arrays
2. Working with Pandas data frames
3. Develop python program for Basic plots using Matplotlib
4. Develop python program for Frequency distributions
5. Develop python program for Variability
6. Develop python program for Averages
7. Develop python program for Normal Curves
8. Develop python program for Correlation and scatter plots
9. Develop python program for Correlation coefficient
10. Develop python program for Simple Linear Regression

Total Contact Hrs 60

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.


HOD

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Principal

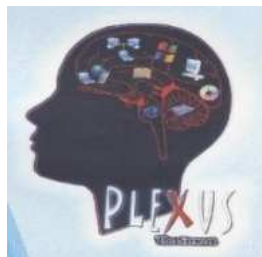
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Department of BCA



SYLLABUS

(Effective for 2022–2025 Batch and onwards)

SEMESTER - III										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs. / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	22UTL3C3	Tamil Paper-III	3	-	-	3	25	75	100	3
	22UHN3C3	Hindi Paper-III								
	22UFR3C3	French Paper-III								
II	22UEN3C3	Communication Skills – III	3	-	-	3	25	75	100	3
III	22UBC307	Core V: Relational Database management System and Oracle	4			3	25	75	100	4
	22UBC308	Core VI: Operating System& Linux	4			3	25	75	100	4
	22UBC3A3	III- Allied: Accountancy For Decision Making	4			3	25	75	100	4
	22UBC309	Core Lab - III: RelationalDatabase Management System and Oracle		5		3	20	30	50	2
	22UBC310	Core Lab- IV: Programming in Linux		5		3	20	30	50	2
IV	22UBC3N1 / 22UBC3N2	Non Major Elective-I: Web Designing Lab Non Major Elective - I : Desktop Publishing Lab	-	1	-	2	-	50	50	2
	22HEC303	Human Excellence - Professional Values & Ethics - SKY Yoga Practice - III	1	-	-	2	20	30	50	1
V		Extension Activities - Annexure I	-	-	-	-	-	-	-	-
EC	22CMM302	Manaiyiyal Mahathuvam - II			15 Hrs.	2	-	50	50	Grade
	22CUB302	Uzhavu Bharatham - II			15 Hrs.	2	-	50	50	Grade
	22UBC3VA	VAC I: PC Assembly & Troubleshooting			30 Hrs.					2*
					45 Hrs.					3*
Total			30						700	25

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; VAC-Department Specific Value Added Course; *Extra Credits;

SEMESTER - IV										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs. / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	22UTL4C4	Tamil Paper-IV	3	-	-	3	25	75	100	3
	22UHN4C4	Hindi Paper-IV								
	22UFR4C4	French Paper-IV								
II	22UEN4C4	Communication Skills – IV	3	-	-	3	25	75	100	3
III	22UBC411	Core VIII: Visual Programming	4			3	25	75	100	3
	22UBC412	Core IX: Java Programming	4			3	25	75	100	3
	22UBC4A4	Allied: IV Mathematics III-Computer Based Optimization Techniques	4			3	25	75	100	3
	22UBC413	Core Lab V: Visual Programming		4		3	20	30	50	2
	22UBC414	Core Lab VI: Java Programming		4		3	20	30	50	2
	22UBC4S1/ 22UBC4S2	SEC II: Naan Mudhalvan: Cloud Computing / DevOps Foundation		2		2	20	30	50	2
IV	22UBC4N1 / 22UBC4N2	Non Major Elective-II:Photo Effects Lab/ Non Major Elective–II: Animation Lab	1	-	-	2	-	50	50	2
	22HEC404	Human Excellence - Social Values & SKY Yoga Practice - IV	1	-	-	2	20	30	50	1
V		Extension Activities - Annexure I	-	-	-	-	-	-	50	1
EC	22CMM403	Manaiyiyal Mahathuvam - III			15 Hrs.	2	-	50	50	Grade
	22CUB403	Uzhavu Bharatham - III			15 Hrs.	2	-	50	50	Grade
	22UBC4VA	VAC II: PC Assembly & Maintenance			30 Hrs.					2*
					45 Hrs.					3*
Total			30						750	24

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; SEC – Skill Enhancement Course; VAC-Department Specific Value Added Course;

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	22UBC307			Title	Batch:	2022-2025	
				Core V: RELATIONAL DATABASE MANAGEMENT SYSTEM AND ORACLE	Semester:	III	
Lecture Hrs./Week	4	Tutorial Hrs./Sem	4		Credits:	4	

Course Objective

This course provides a foundation in data management concepts and database systems. It includes representing information with the relational database model, manipulating data with an interactive query language (SQL). This course focus on relational database management systems, including database design theory: E-R modeling, data definition and manipulation languages, database security and administration. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of Database and Database Management System software	K1
CO2	Understand the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.	K2
CO3	Solve Database problems using Oracle SQL and PL/SQL. This will include the use of Procedures, Functions and Triggers.	K3
CO4	Examine entity relationship and convert entity relationship diagrams in to RDBMS and formulate SQL queries on the data.	K4
CO5	Explain the usage of normalization technique and functional dependency in database design.	K5

Mapping

PO /PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M	H			H	H	M		M		H	H
CO2	M	H	M		H	H	M		H		H	H
CO3	H	H	M		H	H	H		M		H	H
CO4	H	M			H	M	M		M		H	H
CO5	H	H	M	M	M		M		L		H	H

Units	Content	Hrs
Unit I	Introduction - Database System - Applications - Database System Vs File Systems - View of Data- Data Models - Database Language - Database Users And Administrators –Transactions Management –Database System Structure –Application Architecture. Entity–Relationship Model–Basic Concepts – ConstraintsKeys - DesignIssues – ERDiagram–WeakEntity Sets–<i>ExtendedERFeatures</i>–Designof ERDatabase Scheme–Reductionof ER Scheme toTables.	12
Unit II	Relationship Model - Structure of Relational Database – The Relational Algebra – Extended Relational Algebra Operation - Modification of Database – Views - The Tuple Relational Calculus - <i>The Domain Relational Calculus</i>.	12
Unit III	Integrity and Security – Domain Constraints – Referential Integrity – Assertion – Triggers –<i>Security and Authentication</i> – Authorization in SQL- Encryption and Authentication. Relational Database Design – First Normal Form – Pitfalls in Relational Database Design – Functional Dependencies – Decomposition – Desirable Properties of Decomposition–BCNF (Boyce Code Normal Form) –Third Normal Form–Fourth Normal Form–<i>More Normal Form</i>.	12
Unit IV	ORACLE: Introduction–CODD’sRule– Tools of ORACLE–Introduction to SQL–<i>Benefits of SQL</i> - Data Types – DDL – DML –DCL - TCL - Data Constraints. ORACLE SQL Functions –Single Row Functions: Date, Number, Miscellaneous, Conversions, Character Functions–Group Functions–SQL Operators: Arithmetic, Comparison and Logical Operators–Set Operators–Joins– Sub Queries– Views.	12
Unit V	PL/SQL : Introduction–Advantages of PL/SQL – Architecture of PL/SQL – Introduction to PL/SQL Block - Data Types – Control Structures - <i>Concepts of Error Handling</i> – Cursor - Procedure - Functions – Triggers - Types of Triggers. <i>Case Studies:Practical Applications in Real Time Environment</i>	12
	Total Contact Hrs	60

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar,PowerPointPresentation,Chalkandtalk,Quiz,Assignments,GroupTask.

23UBC307

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Silberschatz, Korth,Sudarshan	Database System Concept (Unit1,2&3)	5th Edition, McGraw–Hill International Edition	2006
2	IvanBayross	SQL & PL/SQL Using ORACLE 8i and 9i (Unit 4 & 5)	BPB Publications	2003

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Bipin C.Desai	An Introduction to Data base System	Galgotia Publications	2012
2	C.J.Date	An Introduction to Database System	Eigth Edition, Pearson Education	2003

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	22UBC308			Title	Batch:	2022-2025	
Lecture Hrs./Week	4	Tutorial Hrs./Sem.		Core VI: OPERATING SYSTEM & LINUX	Semester:	III	
					Credits:	4	

Course Objective

To learn concepts relating to structure of operating systems and its functions are including processor scheduling, memory management, and device management. This also covers OS strategies such as concurrency, deadlocks and file system organization. It helps to implement programs in linux environment.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the concept of computer operating systems and its features.	K1
CO2	Understand types and history of operating systems and able to explain modern operating systems and its evolution over the time period.	K2
CO3	Describe how operating systems like Linux and windows will meet the future and real-life needs with respect to efficiency, storage, speed and Security.	K3
CO4	Analyze various operating system functions including memory Management, process management and dead lock prevention strategies.	K4
CO5	Evaluate security, multiprocessing features provided by the Unix operating system using Unix commands, Vi editor and Shell programming.	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	M	H	H	M	M	L	L	M	H	H
CO2	M	H	M	L	L	L	M	M	H	M	M	H
CO3	M	H	M	H	H	H	H	L	H	H	M	H
CO4	H	M	L	L	M	M	M	L	L	L	H	M
CO5	H	H	L	M	H	H	H	L	M	H	H	H

Units	Content	Hrs
Unit I	Introduction to OS – Early History – Hardware: Interrupts and Polling, Buffering, Storage Protection, Online – Offline Operation-Cycle Stealing- Processing-Storage Hierarchy- Reduced Instruction Set Computing (RISC).Semaphores – Process Synchronization with Semaphores – Counting Semaphores. Storage Management: Real Storage – Storage Organization–Storage Management Storage Hierarchy–Swapping–VirtualStorage– Basic Concepts.	12
Unit II	PAGING: Basic Concepts – Segmentation. Dead Lock: Examples – Dead Lock Preventions – Dead Lock Avoidance – Bankers Algorithms Only – Dead Lock Detection – Dead Lock Recovery. Processor Management:Job and Processor Scheduling – Introduction– Scheduling Levels – Scheduling Objectives – Pre emptive Vs Non preemptive Scheduling – Priorities – FIFO Scheduling–Round Robin Scheduling–Quantum Size Shortest Job First Scheduling– Shortest Remaining Time Scheduling–Highest Response Ratio Next Scheduling.	12
Unit III	Auxiliary Storage Management: Disk Performance Optimization – Why Disk – Scheduling is Necessary – Desirable Characteristics of Disk Scheduling Policies – Seek Optimization – Disk Caching – RAM Disks. FILE Database System: Introduction – The File System – File System Functions – Blocking and Buffering – File Organization – Allocating and Freeing Space–FileDescription–Access Control Matrix–Access Control by User Classes– Backup Recovery.	12
Unit IV	Linux: Introduction–File structure of Linux–Directory hierarchy–Environmental variables –file access permissions –utility commands-files – print – login details. VI-editors -three modes-File splitting–pipes and filters–pagingating files–head–tail–grep– process termination – timing process.	12
Unit V	Shell Programming: Creation and execution – command line arguments–logical operations – condition statements – System administration – Booting and shutting down – super user status–Disk management–security– user services– mount–unmount- Installing and managing printers.	12
	Total Contact Hrs	60

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	H.M.Deitel	Operating Systems (Unit 1 to 3)	Wesley Publication, Third Edition	2004 (Unit 1, 2 & 3)
2	Sumitabha Das	Unix, Concepts and applications (Unit 4, 5)	Tata McGraw Hill, Fourth Edition	2006 (Unit 4 & 5)

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Stewart E. Madnick, John J. Donovan	Operating Systems	Tata McGraw Hill, Sixth Edition	2008
2	Williams Stallings	Operating Systems- Internals and Design Principles	Prentice Hall of India, Fifth Edition	2005
3	Mark G. Sobell	Practical Guide to Red Hat Linux	Pearson Edition, Third Edition	2007
4	Andrea Arpaci Dusseau Rezi Arpaci Dusseau	Operating Systems: Three Easy Pieces	Kindle Edition	2015

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	22UBC3A3			Title	Batch:	2022-2025	
Lecture Hrs./Week	4	Tutorial Hrs./Sem.		GE III- Allied: Accountancy for Decision Making	Semester:	III	
					Credits:	04	

Course Objective

To enlighten the students on the basics of Accountancy

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Provide the knowledge of accounting theory based on conceptual Framework of accounting.	K1
CO2	Enable students to understand the concept of accounting.	K2
CO3	Impart knowledge accounting in decision making.	K3
CO4	Analyse and interpret accounting related transactions in accordance with Accounting theory.	K4
CO5	Summarize ratio analysis and fund flow statement	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	H	M	H	H	H	L	H	H	H	H	H	M
CO2	H	H	H	M	H	M	H	H	H	H	H	H
CO3	H	H	H	H	H	H	H	M	H	M	H	H
CO4	H	H	M	H	M	H	H	M	M	H	H	H
CO5	H	M	H	M	H	M	M	M	H	H	H	M

Units	Content	Hrs
Unit I	Financial Accounting: Meaning– Definition– Concepts– Conventions – Accounting Cycle – Methods of Book Keeping– Journal – Ledger – Trial Balance.	12
Unit II	Subsidiary Books and Final Accounts: Subsidiary Books –Purchase Book and Sales Book – Purchase Returns and Sales Returns Book–Cash Book-Single column-Double Column- Triple column Cash book - Preparation of Final Accounts with Simple Adjustments	12
Unit III	Cost Accounting: Meaning– Definition- Objectives- Elements of Cost– Cost Sheet– Meaning– Definition- Methods of Stock Valuation–FIFO-LIFO– Simple Average Method.	12
Unit IV	Management Accounting: Meaning-Definition-Objectives of Management Accounting –Budgetary Control– Cash Budget –Flexible Budget– Material Budget-Sales Budget (Simple Problems)	12
Unit V	Ratio Analysis and FFS: Meaning - Types – Liquidity Ratio – Profitability Ratio – Solvency Ratio-Cash flow Statement-Meaning-Procedures for preparing Cash Flow statement (Simple Problems only)	12
Total Contact Hrs		60

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Distribution of Marks: 20 % Theory & 80% Problems

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Sharma. K, Shashi. K.Gupta	Management Accounting	Kalyani Publishers, New Delhi	2020

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Jain.S.P and Narang.K.L	Cost Accounting	Kalyani Publishers, New Delhi	2020
2	Shukla. M.C And Grewal.T.S And Gupta. S.L	Advanced Accountancy	S.Chand And Co. New Delhi	2020
3	Dr.K.L.Gupta	Accountancy for Managerial Decisions	Sahitya Bhawan Publications	2020

Course Code:	22UBC309			Title	Batch:	2022-2025
Practical Hrs./Week	5	Tutorial Hrs./Sem.	-	Core LAB – III: Relational Database Management System and Oracle	Semester:	III
					Credits:	2

Course Objective

The major objective of this Lab is to provide a strong formal foundation in database concepts. It demonstrates the use of constraints and various types of SQL functions. It also emphasizes the importance of normalization in database and facilitates the students in Database Design.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember Structured Query Language (SQL) queries using DDL,DML, DCL and TCL commands.	K1
CO2	Understand various queries execution such as relational constraints, joins, set operations, aggregate functions, trigger and views.	K2
CO3	Apply Normalization concepts in a database.	K3
CO4	Analyze the techniques used to design and create Relational Database.	K4
CO5	Evaluate options to make informed decisions that meet data storage, processing and retrieval needs.	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	H	H	M		H	H	M	L	M		H	H
CO2	H	M	M		H	H	M		M		H	H
CO3	H	M			H	M	M				M	M
CO4	H	H			H	M	H		H		M	H
CO5	H	H		M	H	H	M	M	H	H	M	H

1. Write Oracle Queries in Data Definition Language.
2. Write Oracle Queries in Data Manipulation Language.
3. Write Oracle Queries in Transaction Control Language.
4. Write Oracle Queries in Data Control Language.
5. Write Oracle Queries using Data Constraints.
6. Manipulate Single Row Function.
7. Manipulate Function – Group function.
8. Generate Operators in SQL plus.
9. Manipulate SET Operators.
10. Generate View.
11. Manipulate the various types of Join Queries.
12. Write PL/SQL to find whether the given number is Even or Odd.
13. Write PL/SQL to find whether the given number is Armstrong or Not.
14. Write PL/SQL to Display ten numbers.
15. Write PL/SQL to reverse of given number.
16. Write PL/SQL to find whether the given number is Prime number or not.
17. Write PL/SQL queries to create Procedure.
18. Write PL/SQL queries to create Function.
19. Write PL/SQL queries to create Cursor.
20. Write PL/SQL queries to create Trigger.
21. Write PL/SQL to Access Restriction Trigger.
22. Create a real time application using Master and Transaction tables.

Total Contact Hours :75

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	22UBC310			Title	Batch:	2022-2025	
				Core Lab- IV: Programming in Linux	Semester:	III	
Practical Hrs./Week	5	Tutorial Hrs./Sem.			Credits:	2	

Course Objective

To familiarize with the Linux commands, environment, fundamentals of shell scripting and programs on basic linux administration.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Apply the various commands in terminal to handle UNIX system files.	K1
CO2	Analyze Linux commands using file and system security	K2
CO3	Discuss shell code in VI editors to solve various problems.	K3
CO4	Analyze and Create file systems and directories	K4
CO5	Distinguish various filter and Pipes commands	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	L	L	L	L	M	L	L	H	M	M
CO2	H	M	M	H	M	H	L	L	M	M	H	H
CO3	H	M	H	H	H	H	H	M	H	H	H	H
CO4	H	M	L	H	M	H	L	L	M	L	H	M
CO5	H	M	H	M	L	M	H	M	L	M	H	M

1. Work with utility commands.
2. Work with directory commands.
3. Work with handling file commands.
4. Work with file access commands.
5. Work with pipes and filters.
6. Work with VI editors.
7. Create a program to find simple interest
8. Create a program to find factorial value
9. Create a program to find Fibonacci series.
10. Create a program to find sum of N numbers.
11. Write a program with case condition.
12. Create a program to find reverse the digit.
13. Create a program to find sum of individual digit.
14. Create a program to swap any two numbers.
15. Create a program for sorting of N numbers.

Total contact hours :75 hrs

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	22UBC3N1			Title	Batch:	2022-2025	
				Non Major Elective-I: Web Designing Lab	Semester:	III	
Practical Hrs./Week	1	Tutorial Hrs./Sem.			Credits:	02	

Course Objective

To provide the necessary knowledge of various techniques in web development and will be able to design a complete website.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the concepts of website Development	K1
CO2	Demonstrate knowledge and skills utilizing various HTML tags for Designing a static webpage.	K2
CO3	Analyze the HTML tags, CSS and JavaScript.	K3
CO4	Recognize and apply the elements of Creating Style Sheet(CSS).	K4
CO5	Develop and incorporate dynamic capabilities in Web page using JavaScript.	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	M	M	M	M	H	M		M	H	H	M	M
CO2	M	H		H	M	M	M		M	M	M	M
CO3	M	H		H	H	M		H	M	M	H	M
CO4	M	H		H	M		M	H	H		M	H
CO5	H	H		H	M		M	H	M	M	M	M

1. Design a home page which will display your information i.e.Biodata.
2. Create Hyperlinks in home page i.e educational details, Hobbies, Achievement, My Ideals etc.
3. Design a time table and display it in tabular format.
4. Designa Registration form in HTML.
5. Design a webpage for Biodata using CSS.
6. Design web page using Frames, Framesets.
7. Embedding Java scripts in HTML pages.
8. Design a Bio data page whose content can be changed using Java Script like events.
9. Design a Signup form with all validations.

Total contact hours : 15 hrs

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	22UBC3N2			Title	Batch:	2022-2025	
				Non Major Elective - I : Desktop Publishing Lab	Semester:	III	
Practical Hrs./Week	1	Tutorial Hrs./Sem.			Credits:	02	

Course Objective

The course is designed to provide a deep knowledge in various image processing tools and effects.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic technical and handling tools.	K1
CO2	Understands the various concepts of Photoshop.	K2
CO3	Apply various effects that is suitable to access various formats in this platform for editing.	K3
CO4	Analyze the concepts of different modes in Photoshop.	K4
CO5	Emphasis is placed on desktop concepts desktop applications, learning and working in the desktop environment.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M	H			M	H		M	H		H	M
CO2	H	M	M	M	H	M	M		L	M	H	H
CO3	M	H		M	H	H	M	M	H	H	H	H
CO4	H	H		H	M	M	M	H	H	H	H	H
CO5	M	H		M	H	H	M	M	H	H	H	H

1. Design the Wedding Invitation using the associated tools in Photoshop.
2. Apply special art effects for the image using various options from the Filter Gallery.
3. Design the Banner.
4. Implement the Usage of different modes in a Single Image.
5. Design the College Profile.
6. Work with different images to implement Sharpen tool and Smudge Tool
7. Design the Calendar.
8. Edit the image using Blur tool.
9. Design the Visiting Card.
10. Edit the image using Burn and Sponge tool.
11. Edit the image using Clone tool.

Total Contact Hrs : 15

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	22UBC411			Title	Batch:	2022-2025	
Practical Hrs./Week	4	Tutorial Hrs./Sem.		Core VIII: Visual Programming	Semester:	IV	
					Credits:	03	

Course Objective

The course gives introduction to the .Net framework, library and various applications involved in it.

It enables the students to learn and develop Windows and Web applications for the .NET platform.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	To understand the concepts of the .NET framework as a whole and the technologies that constitutes the framework.	K1
CO2	Knowledge on ADO.NET with ASP.NET for creating web based data centric applications also understand web services.	K2
CO3	Understand the ASP.NET architecture,web server controls,rich web controls and validation controls,Analyze security management in ASP.NET.	K3
CO4	Use ADO.NET in a web application to read, insert,and update data in a database.	K4

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M	H			M	H		M	H		H	M
CO2	H	M	M	M	H	M	M		L	M	H	H
CO3	M	H		M	H	H	M	M	H	H	H	H
CO4	H	H		H	M	M	M	H	H	H	H	H
CO5	M	H		M	H	H	M	M	H	H	H	H

Units	Content	Hrs
UnitI	Introduction to .NET: Understand .NET Framework– .Net Architecture–CLR, base class library VB .Net : Visual Basic .Net IDE, Compiling and Debugging.	12
UnitII	ASP.NET BASICS: Introduction –ASP.NET architecture - ASP.NET Runtime- Internet Information Services - Visual Web Developer Web Server – ASP.NET Parser –Assembly.	12
UnitIII	WINDOW AND WEB BASED APPLICATIONS Window Based Applications – Core ASP.NET – ASP.NET Web Forms – Server Controls, Data Binding – ASP.NET -Error Handling, Security, Deployment- Validation Controls - Ad rotator Controls- Security.	12
UnitIV	ASP.NET Database Programming Introducing ADO.NET- ADO.NET Basics- ADO.NET Object Model: Data Provider, Data Reader, at Adapter-Data Set -Managed Providers- Understanding Data Binding-Working with Data Grids-Using SQL Server With ASP.NET.	12
UnitV	Advanced ASP.NET ASP.NET Application Configuration-Understanding Caching-Localizing ASP.NET Applications-Deploying ASP.NET Applications-Web Services-Web Services Infrastructure-Understanding SOAP- Building a Web Service.	12
Total Contact Hrs		60

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book**23UBC413**

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Matthew Mac Donald	The Complete Reference “ASP.NET” (Unit 1, 3)	Tata McGraw-Hill Edition	2009
2	Mridula Parihar	ASP.NET Bible (Unit 2, 4, 5)	John Wiley	2002
3	Bill Evjen, Hanselman, Muhammad, Sivakumar & Rader	Professional ASP.NET 2.0 (Unit 3)	Wiley India (p) Ltd.	2006

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Andrew Troelsen,	Pro C# 5.0 and the .NET 4.5 Framework	A press publication	2012
2	Mike Yenderloy	ADO & ADO.Net programming	BPB publications	2002
3	McDownell	ASP.NET complete reference	Sahitya Bhawan Publications	2007

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	22UBC412			Title	Batch:	2022-2025
Lecture Hrs./Week	4	Tutorial Hrs./Sem		Core IX: Java Programming	Semester:	IV
					Credits:	03

Course Objective

This course aims to create an environment to understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. It also helps to test Java servlets while developing Java programs which incorporate advanced graphic functions.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the structure and significance of the Java Programming Language.	K1
CO2	Acquire the knowledge about Java Programming Language for various programming technologies.	K2
CO3	Apply the concept of Inheritance and various Java Components.	K3
CO4	Analyze the usage of event handling on AWT and Swing components	K4
CO5	Evaluate the Internet Programming using Java Applets.	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	H	M	H		M				M	L	H	M
CO2	H	H	H		H	H	M	H	H	H	H	M
CO3	H	H	L			M			H	H	H	H
CO4	H	H	L			M			H	H	H	H
CO5	H	H	L	H		H	H	H	H	H	H	H

Units	Content	Hrs
Unit I	Java Evolution - Overview of Java language, Constants, Variables and Data types - Operators and Expressions. Decision Making and Branching - Decision Making and Looping - Classes, Objects and Methods - Arrays, Strings and Vectors.	12
Unit II	Inheritance-Packages:Putting Classes Together-Multithreaded Programming- <i>Managing Errors and Exceptions.</i>	12
Unit III	Applets Programming-Graphics Programming-The Graphics Class-Lines and rectangles - Circles and Ellipses - Drawing Arcs - Drawing Polygons.	12
Unit IV	A Tour of Swing: JApplet - Icons and Labels - Text Fields – Buttons - The JButton Class - Check Boxes - Radio Button - Combo Boxes - TabbedPane - Scroll Panes - Tree - JMenus.	12
Unit V	Servlet Overview and Architecture: Movement to Server Side Java - What is Java Servlet - Practical Applications for Java Servlet - <i>Java Servlet Alternatives - Reasons to use Java Servlets - Java Servlet Architecture.</i>	12
	Total Contact Hrs	60

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar,Power Point Presentation,Chalk and talk,Quiz,Assignments,GroupTask.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Programming with Java (Unit 1 to 5)	Tata McGrawHill	2007
2	Herbert Schildt	Java: The Complete Reference (Unit 1 to 5)	Tata McGrawHill	2005
3	James Goodwill	Developing Java Servlet (Unit 5)	Techmedia	1999

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	James Keogh, Jim Keogh	J2EE: The Complete Reference	McGraw-Hill/Osborne, Seventh Edition	2002
2	Bruce W. Perry	Java Servlet and JSP Cookbook	O'Reilly	2004

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	22UBC4A4			Title	Batch:	2022-2025
Lecture Hrs./Week	4	Tutorial Hrs./Sem.		Allied: IV Mathematics III- Computer Based Optimization Techniques	Semester:	IV
					Credits:	3

Course Objective

The course provide with the basics of various optimization techniques, the key concepts of linear programming, Transportation, Assignment problem, PERT & CPM. It also offers various mathematical applications in industries and Decision making for realtime environment.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the modeling and computational tools as well as analytic skills to evaluate the problems.	K1
CO2	Understand and explain the various mathematical formulations.	K2
CO3	Apply Working with Non Linear programming Problems.	K3
CO4	Analyze Linear Programming problem and similar such problems into appropriate forms and problem solving.	K4
CO5	Estimate the problem situation for better decisions.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M	M		H	M			M	H	M	H	M
CO2	M	M		H	H				H	M	M	H
CO3	M	H		H	H	M		M	M		M	M

CO4	M	H		H	H	M		M		M	M	H
CO5	M	H	M	H	H	M		M	M		M	H

igh; M-Medium; L-Low

Units	Content	Hrs
UnitI	Linear Programming Problem: Graphical Solution Method- General Linear Programming Problem (Definition alone) - Canonical and Standard forms of LPP. Simplex Method : Basic Solution and Degenerate Solutions to Linear Equation-Simplex Method-BigM Method (Only Simple Problems).	12
UnitII	Transportation Problem : North West Corner Method- Least Cost Method- Vogel's Approximation Method- Moving towards optimality UV Method. Assignment Problem: Definition- Assignment Algorithm- Hungarian Assignment Method- Unbalanced AP.	12
UnitIII	Inventory Control : Introduction- <i>Types of Inventory</i> - Inventory Decision- Economical Order Quantity (EOQ) - Deterministic Inventory Problems.	12
UnitIV	Sequencing Problems : Introduction- Problems with n Jobs and 2 Machines- Problems within Jobs and k Machines- Problems with 2 Jobs and k Machines (Simple Problems).	12
UnitV	Network Scheduling: Introduction- Network and Basic Components- <i>Rules of Network Construction</i> - Time calculation in Networks- CPM-PERT - PERT Calculations- Difference between CPM and Pert Network.	12
Total Contact Hrs		60

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, PowerPoint Presentation, Chalk and talk, Quiz, Assignments, Group Task.
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Text Book**23UBC4A4**

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	Kanti Swarup, P.K.Gupta, Man Mohan	Operations Research (Unit 1 to 5)	Sultan Chand & Sons	1996

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\ EDITION	YEAR OF PUBLICATION
1	R.PaneerSelvam	Operations Research	Prentice Hall of India Pvt Ltd.	2004

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	22UBC413			Title	Batch:	2022-2025
Practical Hrs./Week	4	Tutorial Hrs./Sem		Core Lab V: visual programming	Semester:	IV
					Credits:	02

Course Objective

To develop the practical aspects of application using fundamentals of ASP.Net and C#.
To gain the knowledge of Web server controls, Form validation, Session handling, Error handling, Inheritance, File operations and ADO.Net connectivity.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the ASP.Net applications using standard .net controls	K1
CO2	Understand the decision making statements and user interfacing controls	K2
CO3	Implement and deploy database connection management using ADO.NET	K3
CO4	Analyze simple data binding applications using ADO.Net Connectivity	K4
CO5	Evaluate web-based applications by using various web controls in ASP.NET.	K5

Mapping

PO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO												
CO1		H		M	M	M	M	M	M	H	H	M
CO2	M	M			H	H	M	H	M	H	H	M
CO3		H		M	H	M	H	M		H	H	H
CO4	M	M		H	M	M	M	H	M	M	M	H
CO5	M	H		H	H	H	M	H	H	H	H	H

1. Create a windows form with the following controls Textbox, Radio button, Check box, Command Button
2. Write a program for Menu option.
3. Create a program to connect with database and manipulate the records in the database using ADO .NET
4. Create a program to implement the concepts of OOPS for creating class with inheritance.
5. Create a program to perform input validation using procedure.
6. Write a program to open a file and using I/O operations write contents into a file and read the contents from the file.
7. Create a window form using HTMLcontrols.
8. Create a program to perform validation using validation controls.
9. Create a program inASP.NET to connect with the database using ADODBc onnectivity and manipulate the records.
10. Write a program to store the employee details using class and methods in C# .NET
11. Write a program to Handle Exceptions
12. Write a program to create a form with Basic controls in C#.NET.
13. Write a program in ASP to display the session properties.
14. Write a program inASP that makes use of Ad rotator component.
15. Write a program inASP that makes use of Browser capabilities component.

Total Contact Hours: 60

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	22UBC414			Title	Batch:	2022-2025	
				Core Lab VI: Java Programming	Semester:	IV	
Practical Hrs./Week	4	Tutorial Hrs./Sem.			Credits:	02	

Course Objective

To provide students with the ability to write programs in Java and Advanced Javaby applying concepts described in the Object-Oriented Programming course and develop their programming career.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the concepts of Object-Oriented Programming.	K1
CO2	Understands the concepts of Multithreading and Method Overriding.	K2
CO3	Apply the concept of Applets and Servlets.	K3
CO4	Analyze the concepts of JMenu, JTabbed Pane and JTree.	K4
CO5	Evaluate the usage of Generic Servlet and HTTP Servlet.	K5

Mapping

PO /PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO												
CO1	H	H	M		M	M					M	H
CO2	H	M	M	M	H	M	M		L	M	H	H
CO3	H	H	L		M	M		H	H	H	M	H
CO4	H	H		H	M	M	M	H	H	H	H	H
CO5	H	H		H	H	M	M		M	M	H	M

1. Write a java program for employee details using single inheritance concept.
2. Write a java program to check the given string is palindrome or not.
3. Write a java program for multithreading concept.
4. Write a java program to read and write using random access file.
5. Write a java program to draw lines and rectangles using applets.
6. Write a java program for method overriding.
7. Write a java program using the concept to interface.
8. Write a java program to add two numbers using applets.
9. Write a java program to implement the concept of swing.
10. Write a java program to implement the concept of JMenu, JMenuBar, JMenuItem.
11. Write a program to implement the concept of JTabbed Pane.
12. Write a program to implement the concept of JTree.
13. Write a program to make use of Generic Servlet.
14. Write a program to make use of HTTP Servlet.
15. Write a program to illustrate servlet chaining.

Total Contact Hours: 60

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	22UBC4S1			Title	Batch:	2022-2025
Practical Hrs./Week	2	Tutorial Hrs./Sem.		SEC II: Naan Mudhalvan: Cloud Computing	Semester:	IV
					Credits:	2

Course Objective

To provide students with the fundamentals and essentials of Cloud Computing. To provide students a sound foundation of the Cloud computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the Concepts of Cloud computing	K1
CO2	Understand the Cloud computing fundamentals.	K2
CO3	Apply the fundamental concepts in datacenters to understand the trade offs in power, efficiency and cost.	K3
CO4	Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.	K4
CO5	Analyze various cloud programming models and apply them to solve problems on the cloud.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M	H		H	M		M	H	H		M	H
CO2	H	H		H	M	M	M	M	M	H	M	H
CO3	H	H		H	M		M	H	M	M	M	M
CO4	H	M		M	M	M	M	H	M	H	M	H
CO5	M	H		H	H	M		H	M	M	H	M

1. Creation of Virtual Machines
2. Execution of a sample program in a virtual machine
3. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
4. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs.
5. Install Google App Engine. Create hello world app and other simple web applications using Python /java.
6. Use GAE launcher to launch the web applications.
7. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
8. Find a procedure to transfer the files from one virtual machine to another virtual machine.
9. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
10. Install Hadoop single node cluster and run simple applications like wordcount.

Total Contact Hours :15

Programme Code:	BCA			ProgrammeTitle:	Bachelor of Computer Applications	
CourseCode:	22UBC4S2			Title	Batch:	2022-2025
				SEC II: Naan Mudhalvan: DevOps Foundation	Semester:	IV
Practical Hrs./Week	2	TutorialHrs./Sem.			Credits:	2

Course Objective

Provides the foundations of knowledge, principles and practices from a technical perspective needed to engineer a successful DevOps solution.

Course Outcomes

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

CO Number	COStatement	Knowledge Level
CO1	Recollect the Concepts of DevOps Foundation	K1
CO2	Understand the DevOps Foundation fundamentals.	K2
CO3	Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.	K3
CO4	Identify resource management fundamentals	K4
CO5	Analyze various cloud programming models and apply them to solve problems on the DevOps	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M	H		H	M		M	H	H		M	H
CO2	H	H		H	M	M	M	M	M	H	M	H
CO3	H	H		H	M		M	H	M	M	M	M
CO4	H	M		M	M	M	M	H	M	H	M	H
CO5	M	H		H	H	M		H	M	M	H	M

1. Installing Git- Installing on Linux, Installing on Windows, Initial setup 2. Execute some commands to test connection between knife and workstation 3. Create organization and add yourself and node to organization 4. Create a server and add to organization and Check node details using knife 5. How to Add Run list to Node and Check node Details 6. Create a Environments and add servers to environments 7. Create a program for roles and add Roles to organization 8. Develop Understanding of Attributes, Creating Custom Attributes and Defining in Cookbooks 9. Creating and managing the data bags 10. Creating the data bags using CLI and Chef Console 11. Sample data bags for Creating Users
Total Contact Hours :15

Course Designed by	HOD	CDC	COE
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Name: Mr.A.MURUGANANDHAM Signature:	Name: Dr.K.HARIDAS Signature:	Name: Mr.K.SRINIVASAN Signature:	Name: Dr.R.MANICKACHEZIAN Signature:

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	22UBC4N1			Title	Batch:	2022-2025	
				Non Major Elective-II: Photo EffectsLab	Semester:	IV	
Practical Hrs./Week	1	Tutorial Hrs./Sem.			Credits:	02	

Course Objective

To learn the various photo editing features and animation techniques and demonstrate proficiency in developing the multimedia presentations.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the basic elements and principles of photo editing software to Achieve a great photo effect by applying effects.	K1
CO2	Understand the important aspects of Adobe Photoshop Elements.	K2
CO3	Construct simple documents utilizing selections, layers and blending modes.	K3
CO4	Analyze color management and correction techniques in Adobe Photoshop.	K4
CO5	Evaluate simple shapes using animation editing software and design Simple animation by applying shape tweens and motion tweens.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	H	H			H			M		H	H	H
CO2	H	H	M		H	H	H	H	M	H	H	H
CO3	H	M		M	H	H		H	M	H	H	M
CO4	H	H	H			H	H			H	H	H
CO5	H	H	H			H	H			H	H	H

1. Create a Business Card.
2. Create a Monthly Calendar.
3. Change the Background Transparent and Save it in Transparent Image.
4. Create a Poster with a Fancy Font.
5. Convert Blur Image into Correct Image.
6. Changing Hair Color into Simply Fix Grey Hair.
7. Convert an Image in to Blend Images using Layer Masking.
8. Create a 3D Text.
9. Create an Outline using a Brush Strokes.
10. Create a Photo Manipulation.

Total Contact Hours: 15

Programme Code:	BCA		Programme Title:	Bachelor of Computer Applications	
Course Code:	22UBC4N2		Title	Batch:	2022-2025
Practical Hrs./Week	Tutorial Hrs./Sem.		Non Major Elective–II: Animation Lab	Semester:	IV
				Credits:	02

Course Objective

To learn the concepts Multimedia and Compression Techniques through Graphic design.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect animation software and make them to design animated Applications.	K1
CO2	Understand the gradients and patterns using available tools.	K2
CO3	Apply the concept of timeline animation.	K3
CO4	Analyze innovative character and applying effects with aid of software.	K4
CO5	Evaluate import text, character, paragraph formatting and effects to text.	K5

Mapping

PO/PSO												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M	H			H		M	M	H	H	H	M
CO2	M	M		M			M		M	H	M	H
CO3	L	H		H	H	M	M	M	H	H	H	H
CO4	M	H		M	H	H	M	M	H	M	M	M
CO5	M	M		M	M	M	M	M	M	M	H	M

1. Setting Motion for a Butterfly.
2. Create a Rain Effect.
3. Create a masking.
4. Create a Basket Ball.
5. Create a Text Animation.
6. Design a Cartoon Background.
7. Create a Water Effect.
8. Create a flash website.
9. Create a Lightening Effect for Text.
10. Create an Image Gallery using Buttons.

Total Contact Hours: 15



HOD

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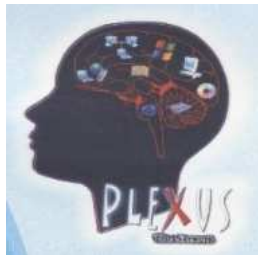
Principal

Dr. R. MUTHUKUMARAN,
M.A., M.Phil., B.Ed., Ph.D.,
PRINCIPAL
N.G.M. College, Pollachi - 642 001
Coimbatore District

Nallamuthu Gounder Mahalingam College (Autonomous)
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Pollachi-642001



Department of BCA



SYLLABUS

(Effective for 2021 – 2024 Batch and onwards)

SEMESTER - V										
Part	Subject Code	Title of the Paper	Hrs / Week		Hrs / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
III	21UBC519	Core - XI : Java Programming	5		5	3	30	70	100	4
	21UBC520	Core - XII :Skill Enhanced Course Software Testing	4			3	30	70	100	4
	21UBC5E1 / 21UBC5E2 / 21UBC5E3	Core Elective - I	5			3	30	70	100	4
	21UBC521	Core Lab - IX: Java Programming		4		3	20	30	50	2
	21UBC522	Core Lab - X : Software Testing		4		3	20	30	50	2
	21UBC523	Project	2	2			20	80	100	3
	21UBC5AL1	Advanced Learner Course – I: Adhoc And Sensor Networks - Self Study					30	70	100	5*
IV	21UBC5S1 / 21UBC5S2	Skill Based Elective - I	3 Hours			2	-	50	50	2
	21HEC505	Human Excellence - National Values & SKY Yoga Practice - V	1	-	-	2	25	25	50	1
	21GKL501	General Awareness - Self Study	SS			2	-	50	50	Grade
V		Extension Activities - Annexure I	-	-	-	-	-	-	-	-
EC	21VAD501	Communicative English (Fluency) - V	-	-	-	-	-	-	-	Grade
	21VAD502	Soft Skills Development - I	-	-	-	-	-	-	-	Grade
Total									650	22
List of Core Electives –I 21UBC5E1 – Networks/ 21UBC5E2 - Grid Computing/ 21UBC5E3 - Data Science			List of Skill Based Electives – I 21UBC5S1 – Mobile Phone Services/ 21UBC5S2 - Internet Of Things							

SEMESTER - VI										
Part	Subject Code	Title of the Paper	Hrs / Week		Hrs / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
III	21UBC624	Core - XIII : Python Programming	4		5	3	30	70	100	4
	21UBC625	Core - XIV : Mobile Application Development	4			3	30	70	100	4
	21UBC6E1 / 21UBC6E2 / 21UBC6E3	Core Elective - II :	5			3	30	70	100	5
	21UBC6E4 / 21UBC6E5 / 21UBC6E6	Core Elective - III :	5			3	30	70	100	5
	21UBC626	Core Lab - XI : Python Programming		4		3	20	30	50	2
	21UBC627	Core Lab - XII : Mobile Application Development		4		3	20	30	50	2
	21UBC6AL2	Advanced Learner Course – II: Disaster Management					30	70	100	5*
IV	21UBC6S3 / 21UBC6S4	Skill Based Elective - II :	3 Hours			2	-	50	50	2
	21HEC606	Human Excellence - Global Values & SKY Yoga Practice - VI	1	-	-	2	25	25	50	1
V		Extension Activities - Annexure I	-	-	-	-	-	-	-	-
EC	21VAD601	Communicative English (Fluency) - VI	-	-	-	-	-	-	-	Grade
	21VAD602	Soft Skills Development - II	-	-	-	-	-	-	-	Grade
Total									600	25
List of Core Electives –II 21UBC6E1 - Storage Management 21UBC6E2 - Current Trends And Technologies 21UBC6E3 - Information Security		List of Core Electives –III 21UBC6E4-Data Mining And Warehousing 21UBC6E5 - Cloud Computing 21UBC6E6- Nano Computing				List of Skill Based Electives – II 21UBC6S3 – Interview Readiness 21UBC6S4 – A 360° Interview Preparation Course				

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC519			Title	Batch:	2021-2024
Lecture Hrs./Week	5	Tutorial Hrs./Sem	5	Core - XI : Java Programming	Semester:	V
					Credits:	04

Course Objective

This course aims to create an environment to understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. It also helps to test Java servlets while developing Java programs which incorporate advanced graphic functions.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the structure and significance of the Java Programming Language.	K1
CO2	Acquire the knowledge about Java Programming Language for various programming technologies.	K2
CO3	Analyze the usage of Inheritance and various Java Components.	K3
CO4	Apply the concept of event handling on AWT and Swing components	K4
CO5	Evaluate the Internet Programming using Java Applets.	K5

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	H	M	H		M				M	L	H	M
CO2	H	H	H		H	H	M	H	H	H	H	M
CO3	H	H	L			M			H	H	H	H
CO4	H	H	L			M			H	H	H	H
CO5	H	H	L	H		H	H	H	H	H	H	H

Units	Content	Hrs
Unit I	Java Evolution - Overview of Java language, Constants, Variables and Data types - Operators and Expressions. Decision Making and Branching - Decision Making and Looping - Classes, Objects and Methods - Arrays, Strings and Vectors.	12
Unit II	Inheritance - Packages: Putting Classes Together-Multithreaded Programming - Managing Errors and Exceptions.	15
Unit III	Applets Programming - Graphics Programming - The Graphics Class - Lines and Rectangles - Circles and Ellipses - Drawing Arcs - Drawing Polygons.	15
Unit IV	A Tour of Swing: JApplet - Icons and Labels - Text Fields – Buttons - The JButton Class - Check Boxes - Radio Button - Combo Boxes - TabbedPane - Scroll Panes - Tree - JMenus.	13
Unit V	Servlet Overview and Architecture: Movement to Server Side Java - What is Java Servlet - Practical Applications for Java Servlet - Java Servlet Alternatives - Reasons to use Java Servlets - Java Servlet Architecture.	15
	Total Contact Hrs	70

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Programming with Java	Tata McGraw Hill	2007
2	Herbert Schildt	Java: The Complete Reference	Tata McGraw Hill	2005
3	James Goodwill	Developing Java Servlet	Techmedia	1999

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	James Keogh, Jim Keogh	J2EE: The Complete Reference	McGraw-Hill/Osborne, Seventh Edition	2002
2	Bruce W.Perry	Java Servlet and JSP Cookbook	O'Reilly	2004

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC520			Title	Batch:	2021-2024
Lecture Hrs./Week	4	Tutorial Hrs./Sem		Core - XII :Skill Enhanced Course Software Testing	Semester:	V
					Credits:	04

Course Objective

The course is to expose the students to different software testing tools and techniques, to plan and create test plan and manage test cases. To gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects using automation tool.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the fundamental concepts and types in software testing.	K1
CO2	Understand the process of applying tests to software and the basic components of a test case.	K2
CO3	Analyze the automation techniques and use modern testing tools to support software testing projects.	K3
CO4	Develop a test plan by learning its process and components.	K4
CO5	Evaluate the test code and automate test execution.	K5

Mapping

PO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO												
CO1	H	H	M		H	H			M	H	H	M
CO2	H	H		M	H	H	M		H	H	H	H
CO3	H	H	M	M	H	H	H	M	H	H	H	H

CO4	M	M	M		M	M				H	M	M
CO5	H	H		M	H	H	H		H	H	H	H

Units	Content	Hrs
Unit I	Software Quality Assurance (SQA), Quality Control (QC), Comparison between QA & QC. Introduction to Testing, Black Box Testing: Equivalence Partitioning- Boundary Value Analysis-Error Guessing- White Box Testing: Statement Coverage-Decision Coverage-Path Coverage- Test Case- Levels of Testing: Unit Testing-Integration Testing- Sub System Testing-System Testing- Acceptance Testing.	12
Unit II	Software Testing Life Cycle-Special Types of Testing: Documentation Testing- Smoke Testing- Sanitary Testing- Compatibility Testing- Usability Testing- Configuration Testing- Disaster Testing- Interoperability Testing- Acceptance Testing- Load Testing- Stress Testing- Recovery Testing-Regression Testing- Security Testing, Client/Server Testing- Web Testing-Performance Testing.	12
Unit III	Test Plan- Phases of Test Plan-Hierarchy of Test Plan-Hierarchy of Test Document-Test Plan Process-Components of a Test Plan.-Verification and Validation- Audits-Reviews-Software Metrics- Process Metrics- Project Metrics-Product Metrics- Testing Metrics.	12
Unit IV	Introduction to Automation Test Tools- Automation Process-Features of Automation Tools: Record and Playback- Integration- Environment Support- Database Test- Data Function- Object Mapping-Image Testing- Object Name-Map-Object Identity Tool-Test/Error Recover-Web Testing- Extensible Language- Mercury Interactive- Quality Standards	12
Unit V	Introduction to WINRUNNER- Two Models for Recording Test: Context Sensitive-Analog Model-Six Main Stages of Testing Process in Win runner- Starting Win runner-Main Win runner-Window- Text Window-User Tool Bar- Executing Commands using Soft Keys- Understanding GUI Map- Viewing GUI Object Properties-Saving the GUI Map.	12
	Total Contact Hrs	60

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1.	Course Material prepared by the Department of Computer Science based on the above web references (Unit 1 to 5).			

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Srinivasan Desikan & Gopalswamy Ramesh	Software Testing	Pearson Edition	2007

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC5E1			Title	Batch:	2021 - 2024
Lecture Hrs./Week	5	Tutorial Hrs./Sem.		Core Elective – I: Networks	Semester:	V
					Credits:	04

Course Objective

To provide a strong background of computer network concepts, a good foundation covering the layers of OSI and TCP/IP model to acquire knowledge and network functionalities into layers.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember computer network basics, network architecture, TCP/IP and OSI reference models.	K1
CO2	Interpret knowledge about essential protocols and their operations.	K2
CO3	Analyze aspects of network security.	K3
CO4	Familiarize the different types of protocols.	K4
CO5	Evaluate detection and correction of errors in transmission.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	H	M		H	H	M	H		H	H	H	H
CO2	M	M	M	M	H		H		H		H	M
CO3	H	H	M	H	M	M	H		H	H	H	H
CO4	M	M		M	M			M	M		M	M
CO5	M	H	M	M	M	H	L		M	M	M	H

Units	Content	Hrs
Unit I	Introduction: Uses of Computer Network- Network Hardware : LAN – WAN – MAN – Wireless – Home Networks. Network Software : Protocol Hierarchies – Design Issues for the Layers – Connection-oriented and connectionless services – Service Primitives – The Relationship of services to Protocols. Reference Models : OSI Reference Model – TCP/IP reference Model	15
Unit II	Physical Layer - Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. Wireless Transmission : Electromagnetic Spectrum – Radio Transmission – Microwave Transmission – Infrared and Millimeter Waves – Light Waves. Communication Satellites : Geostationary, Medium-Earth Orbit, Low Earth-orbit Satellites – Satellites versus Fiber. Data-Link Layer : Error Detection and correction – Elementary Data-link Protocols – Sliding Window Protocols.	15
Unit III	Network Layer : Routing algorithms – Congestion Control Algorithms – IPv4 Addresses – IPv6 Addresses. Transport Layer : <i>Elements of Transport Protocols</i> – Internet Transport Protocols: TCP – Quality of Service.	15
Unit IV	Session Layer : Session and Transport Interaction – Synchronization Points – Session Protocol Data Unit. Presentation Layer : Translation – Encryption/Decryption – Authentication – Data Compression.	15
Unit V	Application Layer : DNS – E-mail: SMTP, POP – File Transfer Protocol – HTTP – Telnet Protocols. Case Studies : Network Security.	15
	Total Contact Hrs	75

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Andrew S. Tanenbaum	Computer Networks	4th edition (Unit -1, 2, 3, 5)	Reprint 2003, PHI.
2	Behrouz A.Forouzan,	Data Communication And Networking	2 nd Edition Update, Genuine Tata Mcgraw – Hill Edition. (Unit – 4)	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Achyut Godbole	Data Communication And Networks	Tata McGraw Hill Edition	2007
2	Uyless Black	Computer Networks Protocols, Standards, and Interfaces	Prentice Hall India, 2nd Edition.	Jan. 1993

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC5E2			Title	Batch:	2021-2024
Lecture Hrs/Week:	5	Tutorial Hrs/Sem		Core Elective – I: Grid Computing	Semester	V
					Credits	04

Course Objective

The course is designed for understanding the fundamental applications, concepts and techniques of grid computing and to gain knowledge for developing skills for grid computing techniques and algorithms to solve practical problems in variety of disciplines.

Course Outcomes (CO)

CO Number	CO Statement	Knowledge Level
CO1	Remember the role of data warehousing and data mining to the decision-support level of organizations	K1
CO2	Understand to differentiate the situations for applying different data mining techniques	K2
CO3	Enhance knowledge to implement different models used for OLAP and data pre-processing	K3
CO4	Able to justify the applicability of grid computing for a specific application.	K4
CO5	Create data mining solutions for different applications.	K5

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M	H		M	H	H	H		H	H	H	H
CO2	H	H		H	H	H	H		H	M	H	H
CO3	H	H		H	H	H	H		H	H	H	H
CO4	M	M			H	M	H		H	H	H	H
CO5	H	H		H	H	H	H		H	H	H	H

Units	Content	Hrs
Unit I	Introduction to Grid Computing: Early Grid Activities – Current Grid Activities – An Overview of Grid Business Areas – Grid Applications – Grid Infrastructure.	15
Unit II	Grid Computing Worldwide Initiatives: Grid Computing Organizations and their Roles – The Grid Computing Anatomy – The Grid Computing Road Map.	15
Unit III	The New Generation of Grid Computing Applications : Merging the Grid Services Architecture with the Web Services Architecture – Service Oriented Architecture – Web Service Architecture – XML Related Technologies and their relevance to Web Services – <i>XML Messages and Enveloping</i> – Service message Description Mechanisms.	15
Unit IV	The Grid Computing Technological Viewpoints: Open Grid Services Architecture (OGSA): Introduction – OGSA Architecture and Goal – Sample Use Cases that Drive the OGSA: Commercial Data Center (CDC) – National Fusion Collaboratory (NFS) – The OGSA Platform Components.	15
Unit V	Open Grid Services Infrastructure (OGSI) – Technical Details of OGSI Specification – Introduction to Service Data Concepts – Grid Service: Naming and Change Management Recommendations – OGSA Basic Services: Common Management Model (CMM) – Service Domain – Policy Architecture – Security Architecture – <i>Metering and Accounting</i> .	15
	Total Contact Hrs	75

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Joshy Joseph, Craig Fellenstein	<i>Grid Computing</i> , (Unit 1 to 5)	IBM Press – Pearson Education, Fifth Impression	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	C.S.R.Prabhu	<i>Grid and Cluster Computing</i>	PHI Learning Private Limited	2009
2	Katarine Stanoevska, Slabeva Thomas Wozniak, Santi Ristol	<i>Grid and Cloud Computing</i>	Springer International Edition	2015

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC5E3			Title	Batch:	2021-2024
Lecture Hrs./Week	5	Tutorial Hrs./Sem		Core Electives –I : Data Science	Semester:	V
					Credits:	04

Course Objective

To develop the student's knowledge in the basic concepts of Python, Machine Learning and Deep Learning.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the fundamentals of Python and R-Programming.	K1
CO2	Understand the basic concepts of Data Wrangling and the process of data flow.	K2
CO3	Analyze the basic concepts in Natural Language Processing and Neural Networks.	K3
CO4	Learn where to apply Machine Learning and Deep Learning.	K4
CO5	Evaluate ML Algorithms and gain knowledge on Outliers.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M				H	H					H	H
CO2					H	M		M	H	H	H	H
CO3		H	M			H	H	M	H	H	H	H
CO4				H	H	H	H		H	H	H	H
CO5	M	H		H	H	H				H	H	H

Units	Content	Hrs
Unit I	Python for Data Science: Why Python – IDEs for Python Programming – Packages – Top 10 DS Packages in Python – Modules in Python – Introduction to R – Commands – Objects – Variables – Data Visualization – Basic Graphs using R.	15
Unit II	Data Wrangling – Definition - Analytic Process – Cross Industry Standard for Data Mining – Sources of Data – The Data Science Process – Process Flow – The Data Scientist Role – Data Wrangling Steps.	15
Unit III	Natural Language Processing – Statistical Language Models – Unigram Model – Bigram Model – N-gram Models—Logistic Regression – Neural Network – DNN - NTypes of Neural Network.	15
Unit IV	Machine Learning – What is Machine Learning? – Components of Machine Learning – Types – ML Algorithms – Comparison of K-Means and DB Scan - Deep Learning – What is Deep Learning? – Applications of Deep Learning.	15
Unit V	Data Preprocessing – Why Data Preprocessing? – Data Transformations – Identifying and Handling the missing values - Encoding the Categorical Data – Ways to Encode- Normalization vs Standardization- - <i>Case studies on Machine Learning Algorithms</i> – Outliers.	15
	Total Contact Hrs	75

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jurafsky and Martin	Speech and Language Processing	Prentice Hall, 2nd Edition	2008

Reference Websites

S.NO	WEBSITES
1	https://towardsdatascience.com/data-preprocessing-concepts-fa946d11c825
2	https://developers.google.com/machine-learning/clustering/clustering-algorithms
3	https://towardsdatascience.com/your-guide-to-natural-language-processing-nlp-48ea2511f6e1
4	https://www.ibm.com/cloud/learn/natural-language-processing

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	21UBC521			Title	Batch:	2021 - 2024	
				Core Lab - IX: Java Programming	Semester:	V	
Practical Hrs./Week	4	Tutorial Hrs./Sem.			Credits:	02	

Course Objective

To provide students with the ability to write programs in Java and Advanced Java by applying concepts described in the Object-Oriented Programming course and develop their programming career.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of Object-Oriented Programming.	K3
CO2	Visualize and Recognize the concept of Applets and Servlets	K4
CO3	Recognize and apply the elements of interactive user interfaces using the Java Swing class and appropriate layout managers.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	H	H	M		M	M					M	H
CO2	H	H	L		M	M		H	H	H	M	H
CO3	H	H		H	M	M	M	H	H	H	H	H

1. Write a java program for employee details using single inheritance concept.
2. Write a java program to check the given string is palindrome or not.
3. Write a java program for multithreading concept.
4. Write a program in java to read and write using random access file.
5. Write a java program to draw lines and rectangles using applets.
6. Write a program in java for method overriding.
7. Write a program in Java using the concept of interface.
8. Write a program to add two numbers using applets.
9. Write a program to implement the concept of swing.
10. Write a program to implement the concept of JMenu, JMenuBar.JMenuItem.
11. Write a program to implement the concept of JTabbedPane.
12. Write a program to implement the concept of JTree.
13. Write a program to make use of Generic Servlet.
14. Write a program to make use of HTTP Servlet.
15. Write a program to illustrate servlet chaining.

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC522			Title	Batch:	2021-2024
Practical Hrs./Week	4	Tutorial Hrs./Sem		Core Lab - X : Software Testing	Semester:	V
					Credits:	02

Course Objective

The course has been designed to provide knowledge on how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, and generate a testing report

Course Outcomes (CO)

Upon completion of this course students shall be able to

CO Number	Co Statement	Knowledge Level
CO1	Understands the Automation testing approach and to write test suites for software	K3
CO2	Generate test cases from software requirements using various test processes for continuous quality improvement	K4
CO3	Develop analyzing techniques through automation testing tool	K5

Mapping

PO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO												
CO1		H	M	M	H	H	H	H	M	H	H	H
CO2	H	M			H	M		H	H	H	M	H
CO3		H	M	M	H	H		H	H	H	H	H

1. To perform some basic operation using calculator in context sensitive mode.
2. To perform some basic operation in paint using Win Runner Analog Mode.
3. To create a GUI checkpoint for single Property using Win Runner.
4. To create a GUI-SPY using Win Runner.

5. To perform an operation in data driver wizard using Win Runner.
6. To develop a test script to test addition of two numbers in VB using GUI checkpoint.
7. To develop a test script for testing calculator using GUI checkpoint.
8. To develop a test script for testing Flight Reservation using GUI checkpoint.
9. To develop a test script to test the Timer control application and adding GUI checkpoint.
10. To develop a test script for List box application developed in VB.
11. To develop a test script for student details using GUI in database checkpoint.
12. To develop a test script for testing Railway Reservation using synchronization point.
13. To develop a test script for testing bank details application developed in VB using insert function.
14. To develop a test script for testing Hotel Management application using insert function and data driver Wizard.
15. To work with insert function for object window in Win Runner.

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC523			Title	Batch:	2021 – 2024
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.		Project and Viva-Voce	Semester:	V
					Credits:	3

BACHELOR OF COMPUTER APPLICATIONS
PROJECT and VIVA VOCE

Guidelines

Introduction

The title of the project work and the organization will be finalized at the end of fifth Semester. Each student will be assigned with a Faculty for guidance.. The Project work and coding will be carried by using the facility of computer science lab as well as in the organization. Periodical review will be conducted to monitor the progress of the project work. Project report will be prepared and submitted at the end of the semester. External examiner appointed by the Controller of Examination will conduct the viva voce examination along with respective guide.

Area of Work

- Web Based Development
- Mobile app development
- Website development
- IOT Projects
- Big Data and Data Mining Projects
- Cloud Computing Projects
- Networking Projects
- Artificial Intelligence and Machine learning Projects
- Data Analytics Projects using Python, R, Tableau etc..
- System Software
- Web Security Projects
- Image Processing Processing

Methodology

Arrangement of Contents:

The sequence in which the project report material should be arranged and bound as follows:

1. Cover Page & Title Page
2. Bonafide Certificates from Organization(Mandatory)
3. Declaration
4. Acknowledgement
3. Synopsis
4. Table of Contents.
5. Chapters
6. Appendix
- 7 Reference

Format of Table of Contents

TABLE OF CONTENTS

Chapter No.	Title	Page No.
i	Certificates	
ii	Declaration	
iii	Acknowledgement	
iv	Synopsis	
1.	Introduction	
	Introduction	
	Objective of the Project	
	Company Profile	
	System Specification	
	Hardware Speification	
	Software Specification	

2	System Study
	Existing System
	2.2.2 Drawbacks
	Proposed System
	• Planning and Scheduling
3	System Design
	3.2 Overview of the Project
	• Modules of the Project
	• Input Design Format
	• Output Design
	• Table Design
	Supporting Diagrams (ER/DFD/UseCase)
4	Implementation and Testing
	Coding Methods
	Testing Approach
	Implementation and Maintenance
5	Project Evaluation
	Project Outcome
	Limitation of the Project
	Further Scope of the Project
6	Conclusion
7	Appendix
	Source Code
	Screenshots and Reports
8	References

Size of the Project

The Project Report contents should be maximum of not exceeding 60 pages

Assessment Method

Internal Assessment: 20 Marks

Criterion	Mode of Evaluation	Marks	Total
I	Synopsis, Company profile, System Specification, Existing system, Proposed system OR (For android Developments) Planning Stage	5	20
II	Supporting Diagrams like system flowchart, ER, DFD, Usecase and Table Design OR UI and UX Design Application Architect and Prototyping	10	
III	Coding, Input forms, Output format, testing OR Development, Testing Preparation of rough draft	5	

External Assessment: 80 Marks

Mode of Evaluation	Marks	Total
Project Report		
Title Relevance of the Industry/Insitute	10	60
Technology	10	
Design and development Publishing	20	
Testing, Report	20	
Viva Voce		
Project Presentation	10	20
Q&A Performance	10	

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC5S1			Title	Batch:	2021-2024
Lecture Hrs./Week	3	Tutorial Hrs./Sem		Skill Based Elective - I : Mobile Phone Services	Semester:	V
					Credits:	02

Course Objective

The course has been designed to provide knowledge on Mobile Repair configuration, assembly, testing and Maintenance.

Course Outcomes (CO)

Upon completion of this course students shall be able to

CO Number	Co Statement	Knowledge Level
CO1	Understand the application and software compatibility with the Mobile Phone technologies	K1
CO2	Acquire knowledge about tools and equipment of mobile phone parts	K2
CO3	Analyze Repair and Diagnose Problem of all kinds of faults in Mobile Phone in Hardware as well Software	K3
CO4	Identify appropriate tools and manuals for repairing the specific issues	K4
CO5	Explain about Fault finding, troubleshooting and repairing of various faults	K5

Mapping

PO/ PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	M	H		M		M		L	M		H	H
CO2		M				M	M	L	M	M	H	H
CO3	H	H		M	H	M	M	H	H	M	M	M
CO4		M			M	M			H	H	H	H
CO5	H			H		H			M		H	H

Units	Content	Hrs
Unit I	Basics of mobile communication - Scope and Opportunities for Mobile Repairing business - Identify business opportunities - Types of Mobile Phones and Technologies - Latest Trends.	9
Unit II	Mobile phone parts – Motherboard - Integrated Circuit - BGA and SMD chips – Screen - Microphone – Sensors - Cables.	9
Unit III	Mobile repair Equipments - Handling - DC Power Supply - Multimeter - soldering iron - Battery Booster - PCB Holder - Microscope.	9
Unit IV	Hardware Repair - Repairing procedure – Cleaning - Assembling & disassembling - Change of different ICs - Soldering & DE soldering procedures.	9
Unit V	Software Repair - Flashing - Driver Software - Mobile Software - Software Installation methods - Fault finding & Troubleshooting – Mobile Bricking - Antivirus Installation.	9
	Total Contact Hrs	45

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, Assignment, Case Study

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Sanjib Pandit	Advance Mobile Repairing: Multicolour Circuits, Service Diagrams & Repairing	BPB Publications	2010

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1		Mobile Repairing Jumper Book All In One	GT Publications	2016

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	21UBC5S2			Title	Batch:	2021 - 2024	
Lecture Hrs./Week	3	Tutorial Hrs./Sem.		Skill Based Elective - I : Internet Of Things	Semester:	V	
					Credits:	02	

Course Objective

To understand the fundamentals of Internet of Things and its protocols. They also understand how to acquire sensor data, make available on the Internet and visualize sensor data and will be able to build simple low-cost embedded systems using Raspberry Pi to apply the concept of IOT in the real-world applications.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the concept and significance of IOT and its services.	K1
CO2	Understand the different IOT Technologies like Micro-controller, Wireless communication like Blue Tooth, GPRS, Wi-Fi and Storage and embedded systems	K2
CO3	Deploy and test different protocols and prototypes in IOT.	K3
CO4	Analyze various architecture, operation, and business benefits of an IOT solution.	K4
CO5	Experiment IOT systems and test its connection to the cloud computing, big data and machine learning disciplines.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	M		H	M		L		M	M	M
CO2	M	H	H	M	H	H	H		H	M	H	M
CO3	M	M	M	H		H	H		H	M	H	H
CO4		M	H		H	H		M	H	H	H	H

CO5	M	M	H	H	H	H	H	M	H	H	H	H
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Units	Content	Hrs
Unit I	Introduction to IOT: Internet of Things – Physical Design – Logical Design – IOT Enabling Technologies – IOT Levels & Deployment Templates – Domain Specific IOTs.	9
Unit II	IOT Architecture: M2M high-level ETSI Architecture – IETF Architecture for IOT. IOT Platform Design Methodology: Introduction-Design Methodology-IOT System Management.	9
Unit III	IOT Reference model – Domain model - Information model - functional model – Communication model - IOT Reference Architecture - IOT Protocols.	9
Unit IV	Building IOT with RASPBERRY Pi: IOT Systems – Logical Design using Python – IOT Physical Devices and Endpoints – IOT Device – Building blocks – Raspberry Pi – Programming Raspberry Pi with Python.	9
Unit V	Case studies: IOT Design-Home Automation, Cities, Environment, Agriculture, Productivity Applications.	9
	Total Contact Hrs	45

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Arshdeep Bahga , Vijay Madisetti	Internet of Things: A hands-on Approach	Universities Press	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dieter Uckelmann, Mark Harrison, Michahelles, Florian	Architecting the Internet of Things	Springer	2011
2	Honbo Zhou	The Internet of Things in the cloud: A Middleware Perspective	CRC Press	2012
3	Olivier Hersent, David Boswarthick, Omar Elloumi	The Internet of things – Key applications and Protocols	Wiley	2012

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications
Course Code:	21UBC624			Title	Batch: 2021-2024
Lecture Hrs./Week	4	Tutorial Hrs./Sem	5	Core - XIII : Python Programming	Semester: VI
					Credits: 04

Course Objective

The course is designed to covers the Basic knowledge of Python Programming. It is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the fundamental concept of python programming.	K1
CO2	Understand the control flow, Operators and looping statements	K2
CO3	Analyze and develop programs using Functions & modular programming.	K3
CO4	Applying the Errors handling Mechanisms while working with Exception	K4
CO5	Evaluate object oriented features and organize files.	K5

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M	M		M	M	H			M	M	H	M
CO2	M	M		M	H	M	M		H	M	H	M
CO3	H	H	M		H	H			H	H	H	H
CO4	H	H	M	M		H	M		H	H	H	H
CO5	H	H				H	H		H	H	H	H

Units	Content	Hrs
Unit I	Basics: Python- Variables- Executing Python From the Command Line - Editing Python Files-Python Reserved Words-Basic Syntax-Comments-Strings And Numeric Data Types-Simple Input and Output.	10
Unit II	Control Statements : Control Flow and Syntax-Indenting- If Statement-Relational Operators- Logical Operators- Bit Wise Operators- While Loop-Break and Continue- For Loop-Lists-Tuple -Sets-Dictionaries.	10
Unit III	Functions : Definition- Passing Parameters to a Function-Variable Number of Arguments- Scope-Passing Functions to a Function- Mapping Functions in a Dictionary-Lambda-Modules- Standard Modules- Sys-Math- Time- Dir Function.	11
Unit IV	Error Handling : Run Time Errors-Exception Model-Exception Hierarchy-Handling Multiple Exceptions-Data Streams-Access Modes Writing-Data to a File Reading-Data From a File-Additional File Methods-Using Pipes as Data Streams-Handling IO Exceptions-Working With Directories.	12
Unit V	Object Oriented Features : Classes Principles of Object Orientation- <i>Creating Classes</i> -Instance Methods-File Organization-Special Methods- <i>Class Variables</i> - <i>Inheritance</i> -Polymorphism-Type Identification-Simple Character Methods- <i>Special Characters</i> - <i>Character Classes</i> -Quantifiers-Dot Character-Greedy Matches-Grouping-Matching at Beginning or End-Match Objects-Substituting-Splitting a String-Compiling Regular Expressions.	12
	Total Contact Hrs	55

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Mark Summerfield	Programming in Python 3	A Complete Introduction to the Python Language”, Addison-Wesley Professional	2009
2	Martin C.Brown	Python: The Complete Reference	McGraw-Hill	2001

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Allen Downey, Jeffrey Elkner, Chris Meyers	Learning With Python	Green Tea Press, Wellesley, Massachusetts.	2016
2	Wesley J Chun	Core Python Application Programming.	Prentice Hall Press Upper Saddle River, NJ, USA	2012
3.	Mark Lutz.	Learning Python	O'Reilly & Associates, Inc. Sebastopol	2003

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	21UBC625			Title	Batch:	2021-2024	
				Core - XIV : Mobile Application Development	Semester:	VI	
Lecture Hrs./Week	4	Tutorial Hrs./Sem			Credits:	04	

Course Objective

To provide a practical approach for Android mobile application development and theoretical knowledge about windows application.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the history of Android development and what is required to build Android apps.	K1
CO2	Understanding Android application architecture, including the roles of the task stack, activities, and services.	K2
CO3	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.	K3
CO4	Analyze the implementation of messaging and location-based services.	K4
CO5	Evaluate developed app and publish in market.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	H	M		M	H			H	H	H	M	M
CO2	H	H			H	M	H	H		H	H	M
CO3	H	M			M		M	H		H	H	H
CO4	M	M		H	H	M	M	H		M	M	H
CO5	M	M	M	M	H		M	M	M	H	H	M

Units	Content	Hrs
Unit I	Getting Started with Android Programming: What is Android? - Obtaining the Required tools, Creating Your First Android Application, Anatomy of an Android Application.	12
Unit II	Activities, Fragments and Internets: Understanding Activities, Linking Activities Using Intents, Calling Built-in Applications Using Intents, Displaying Notifications.	12
Unit III	Getting to know the Android User Interface: Understanding the Components of a screen, Adapting to display Orientation, <i>Managing Changes to Screen Orientation.</i>	12
Unit IV	Designing Your Interface with Views: Using Basic Views, Using Picker Views, Using List Views to Display Long Lists. Data persistence: Saving and Loading User Preferences, Persisting Data to Files, Creating and Using Databases. Content Providers: Using a Content Provider, Creating Your Own Content Provider, Using the Content Provider.	12
Unit V	Messaging: SMS Messaging, Sending E-Mail. Location-Based Services: Displaying Maps, <i>Getting Location Data.</i>	12
	Total Contact Hrs	60

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Wei-Meng Lee	Beginning ANDROID 4 Application Development (Unit 1 to 5)	Wiley Publications	2015 Edition

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Barry A. Burd	Android Application Development AA-in-one for Dummies	2nd Edition	August 2015
2	Reto mierz	Professional Android 2 Application Development	2 nd Edition	March 2010

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC6E1			Title	Batch:	2021-2024
Lecture Hrs./Week	5	Tutorial Hrs./Sem.		Core Elective II : Storage Management	Semester:	VI
					Credits:	05

Course Objective

The main objective of the course is to understand the fundamental storage system architectures and storage performance management.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remembering the storage architectures, storage subsystems and variety of storage system environments.	K1
CO2	Understanding different RAID levels and their suitability on different Application environments .	K2
CO3	Analyzing the characteristics and components of Storage Area Networks (SAN).	K3
CO4	Evaluate the components of SAN, Fibre Channel (FC) protocols and topologies, file sharing operations and protocols on Network Attached Storage (NAS).	K4
CO5	Review the different backup, recovery topologies to create their role in providing disaster recovery, types of storage virtualization and file level virtualization .	K5

MAPPING

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M	M		L	M	M			M		H	M
CO2	H	M			M	H	M			M	H	H
CO3	M	M			H	L	L		M		H	M
CO4	H	M		M	H	M	M		M	H	H	H
CO5	H	M		M	H	H	H		M	H	H	H

Units	Content	Hrs
Unit I	Introduction to Information Storage and Management: Information Storage: Data – Type of Data - Information - Storage – Evolution of Storage Technology and Architecture - Data Center Infrastructure – Core Element - Key Requirement for Data Center Elements - Key Challenges in Managing Information Lifecycle : Information Life Cycle Management.	15
Unit II	Storage System Environment and RA/D: Components of Storage System Environment: Host - Connectivity- Storage Disk Drive Components - Platter, Spindle, Read/Write Head, Actuator Arm Assembly, Controller, Physical Disk Structure, Zoned Bit Recording, Logical Block Addressing - Data Protection: RA/D: Implementation of RA/D Software RA/D - Hardware RA/D-RA/D .	15
Unit III	Intelligent Storage System and Storage Area Network: Components Of An Intelligent Storage System: Front End - Cache – Back End - High End Storage Systems - Midrange Storage System - Storage Area Network: Fibre Channel: Overview - The SAN and its Evolution - Components of SAN - SAN Management Software - Fibre Channel Architecture.	15
Unit IV	Network Attached Storage and Content Addressed Scheme: Network	15

	Attached Storage: General Purpose Servers Vs NAS Devices - Benefits of NAS - Content Addressed Storage: Fixed Contents and Archives - Types of Archives - Features and Benefits of CAS.	
Unit V	Storage Virtualization, Backup and Recovery: Forms of Virtualization: Memory Virtualization - Network Virtualization – Server Virtualization - Storage Virtualization- - Backup And Recovery : Backup Process - Disaster Recovery - Operational Back Up - Backup And Restore Operations - Virtual Tape Library.	15
	Total Contact Hrs	75

- The topics given in **Italics** are noted as Self-Study topics.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	G. Somasundaram and Alok Shrivatsava,	“Information Storage Management: Storing, Managing and Protecting Digital Information”, (Unit 1 to 5).	Wiley,	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ulf Troppens et al	Storage Networks Explained: Basics and Application of Fibre Channel SAN	NAS, ISCSI, INFINIB and FOCE”, Wiley	2015
2	Hubbert Smith	Data Center Storage: Cost- effective strategies, implementation and management	CRC Press	2011

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC6E2			Title	Batch:	2021-2024
Lecture Hrs./Week	5	Tutorial Hrs./Sem.		Core Elective II : Current Trends and Technologies	Semester:	VI
					Credits:	05

Course Objective

The main objective of the course is to study and apply IT applications with a wide range of concepts and technical skills in the areas to succeed in the future.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Explore the research and latest trends in technology	K1
CO2	Get the idea to apply an Objectives and Guidance of Cyber security.	K2
CO3	Analyze the terminology used by SAP ABAP, knowledge of big data and its technologies in Big Data Analytics.	K3
CO4	To keep in mind of Cyber Security Policy and Security Evolution.	K4
CO5	Implement the Data and Knowledge Management and use of Devices in IOT Technology.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	M	H		M	H	M	M		H	M	H	M
CO2	M	H		M	H	H	M		H	M	H	H
C03	H	H		H	H	H	H		H		H	H
C04	M	H		H	H	H	H		H	H	H	H
C05	H	H		H	H	H	H		H	H	H	H

Units	Content	Hrs
Unit I	Introduction - Putting the Internet of Things forward to the Next Level - Internet of Things Strategic Research and Innovation Agenda: Internet of Things Vision - Internet of Things Strategic Research and Innovation Directions - IOT Smart X Applications.	15
Unit II	Introduction SAP: Definition – SCM Applications component with some definitions – SAP SCM-APO – SCM processes – Activities – Objectives. Technical overview and System Architecture: Business Application components – Middleware – Multi-tier computing architecture – SAP kernel architecture.	15
Unit III	Fundamentals of Big Data: Evolution of Data Management-Managing the data – Big Data – Big data management architecture. Big Data Types: Structured data – Unstructured Data –Real Time and Non- real time requirements – Big Data together. Distributed Computing: History of Distributed Computing – <i>Basics of Distributing Computing</i> – Performance.	15
Unit IV	Data Science: Introduction- What is Data Science –Big Data and Data Science Hype-Statistic Inference-Exploratory Data Analysis-the Data Science process. Case Study: Real Direct.	15
Unit V	Block chain :Introduction: Define block chain- structure and operational	15

	aspects of Bitcoin blockchain, - <i>compare different types of block chains</i> -The concept of asymmetric key encryption- the concept of hashing - techniques that use algorithms to manage the integrity of transactions and blocks in blockchain.	
	Total Contact Hrs	75

- The topics given in **Italics** are noted as Self-Study topics.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	OvidiuVermesan and Peter Friess	Internet of Things - From Research Innovation to Market Deployment (Unit 1)	River Publishers	2014
2	Agrawal	Programming in Sap Apo (Unit 2)	Mcgraw Hill Edition	2013
3	Judith Hurwitz, Alan Nurgent, Dr. Fern Halper, Marcia Kaufman,	Big Data for Dummies (Unit 3)	First Edition, A Wiley Publication	2013
4	Cathy O'Neil and Rachel Schutt	Doing Data Science, Straight Talk From The Frontline(Unit 4).	O'Reilly	2014
5	Manav Gupta	Block Chain (Unit 5)	2 nd IBM Limited Edition	2018

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	21UBC6E3			Title	Batch:	2021-2024	
Lecture Hrs./Week	5	Tutorial Hrs./Sem		Core Elective - II : Information Security	Semester:	VI	
					Credits:	05	

Course Objective

This course aims on designing and building secure computer systems that protect information and resist attacks. It covers all aspects of cyber security including network security, computer security and information security.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Facilitate students to understand the significance of Information Security.	K1
CO2	Help students to gain knowledge about public key encryption, Authentication and hash functions.	K2
CO3	Identify the issues in Network Security and Intrusion Detection and Defensive Programming.	K3
CO4	Analyze the basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.	K4
CO5	Evaluate the security features and Cyber security law in real life situations.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	L	M	H	H	M		L		M	L	H	H
CO2	M	M	M	H	H	H	M		M	M	H	H
CO3			H		H	M	H		H	H	M	M
CO4		H	M	M	M	H	M	H	M	M	M	H
CO5	H	H	H	H	M	M	H	H		H	H	H

Units	Content	Hrs
Unit I	Introduction to Computer Security: Basic Concepts – Security Trends – OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms - Threat models - Common Security Goals - Memory protection – Block Ciphers, Stream Ciphers - Security Evaluation.	15
Unit II	Cryptography: Cryptographic Protocols - Encryption – Message Authentication Code – DES - Hash Functions – Symmetric Key Algorithms: DES, AES – Public key Algorithms: RSA, DSA - Secure channels.	15
Unit III	Network Security: Intruders – Intrusion Detection – Password Management – Malicious Software – Viruses and Related Threats – Countermeasures – Distributed Denial of Service Attacks – Firewalls – Design Principles – Trusted Systems.	15
Unit IV	Software Security: Secure software engineering – Hackers, Crackers, and Attackers – Security Failures – Technical Trends affecting Software Security - Defensive programming and its Techniques- Buffer overruns and other implementation flaws.	15
Unit V	Cyber security: Classification of Cybercrimes - Case Studies: Privacy - Mobile code – Security and the Law - The legal perspective – Indian perspective, Global perspective - Cyber Stalking and Obscenity in Internet – Electronic Voting.	15
	Total Contact Hrs	75

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Debby Russell and Sr. G.T.Gangemi	Computer Security Basics	O'Reilly Media	2006
2	William Stallings	Cryptography and Network Security	Prentice Hall	2008
3	Nina Godbole, Sunit Belapure	Cyber Security – Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	Wiely India Pvt Ltd	2011

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Charles P pfleeger and Shai Lawrence pfleeger	Security in Computing	Prentice Hall	2007
2	Behrouz A. Forouzan	Cryptography and Network Security	Tata Mc-Graw Hill Publications	2007

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC6E4			Title	Batch:	2021 - 2024
Lecture Hrs./Week	5	Tutorial Hrs./Sem.		Core Elective - III : Data Mining And Warehousing	Semester:	VI
					Credits:	05

Course Objective

To learn the basic concepts, applications and techniques of data mining and to develop skills for applying data mining techniques and algorithms to solve practical problems in data and information management, retrieval and knowledge discovery in various disciplines.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the concept of data mining, warehousing and knowledge discovery process.	K1
CO2	Understand data pre-processing techniques like cleaning, integration and data transformation strategies.	K2
CO3	Describe the knowledge discovery process and its algorithms including k-nearest neighbour, decision trees, association rules and neural networks.	K3
CO4	Analyze the data modeling, design and implementation of cloud warehousing solutions for emerging internet and cloud environments.	K4
CO5	Evaluate KDD environment by visualizing the reports using various analysis and query tools.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H			H	M		M	H	M	H	H
CO2	M	H			M	H	H		H		M	M
CO3	H	M	H		H	H		L	M	M	H	M
CO4	M		H	H	M	M	H		H	M	H	H
CO5	M	H			M	H	L	M	M	M	M	H

Units	Content	Hrs
Unit I	Introduction to Data Mining: Definition- Kinds of Data- Kinds of Patterns - Technologies used – Major Issues in Data mining – Data mining Applications & Trends – Data objects & Attribute types – Data visualization.	15
Unit II	Data Preprocessing: Data cleaning: Missing values, Noisy data, Data cleaning as a process-Data Integration: Entity Identification problem, Redundancy and correlation analysis, Tuple Duplication, Data value conflict detection & resolution – Overview of Data reduction strategies – Data transformation strategies overview.	15
Unit III	Knowledge Discovery Process: Data Selection-Cleaning-Enrichment-Coding-Data Mining-Preliminary Analysis of Data Set Using Relational Query Tools-Visualization Techniques-Likelihood and Distance-OLAP Tools-K-Nearest Neighbour-Decision Trees-Association Rules-Neural Networks-Genetic Algorithms-Reporting.	15
Unit IV	Setting up KDD Environment: Introduction - Different forms of Knowledge - Getting Started - Data Selection – Cleaning - Enrichment – Coding - Reporting - 10 Golden Rules.	15
Unit V	Data warehousing: Basic concepts – Modeling – Design and usage – Data warehouse Implementation – Data generalized by Attribute – Oriented Induction.	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jiawei Han, Micheline Kamber, Jian pei	Data mining concepts and Techniques	Morgan Kaufmann Publishers, 3 rd edition	2011 (Unit 1,2 & 5)
2	Pieter Adriaans Dolf Zantinge	Data Mining	Addison Wesley Publications, Second Edition	2000 (Unit 3 & 4)

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ian H. Witten Edile Frank	Data Mining- Practical Machine Learning Tools & Techniques	Elsevier Second Edition	2005
2	Daniel T. Larose	Data Mining Methods and Models	John Weiley & Sons	2006
3	Arun K.Pujari	Data Mining Techniques	Universities Press Third Edition	2013

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC6E5			Title	Batch:	2021 - 2024
Lecture Hrs./Week	5	Tutorial Hrs./Sem.		Core Elective - III : Cloud Computing	Semester:	VI
					Credits:	05

Course Objective

This course provides with the basics of Cloud Computing, the key concepts of Virtualization and different Cloud Computing services. It also offers students a sound foundation of the Cloud environment so that they are able to start using and adopting Cloud services in their real life scenarios.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.	K1
CO2	Demonstrate the fundamental concepts of cloud storage and their use in storage systems such as Amazon S3 (Simple Storage Service) and Microsoft Azure.	K2
CO3	Apply fundamental concepts in cloud infrastructures to understand the tradeoffs in power, efficiency and cost.	K3
CO4	Analyze the performance of Cloud Computing.	K4
CO5	Explain the core issues of Cloud Computing such as security, privacy, and interoperability.	K5

Mapping

CO s	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO11	PSO12
CO1		H		H	M	H	H		H		H	H
CO2		H		H	M	H	H		H		H	H
CO3		M		H	M	H	H		H		H	H

CO4		H		H	H	H	H		H		H	H
CO5		M		H	M	M	M		H		H	H

Units	Content	Hrs
Unit I	Cloud Computing Basics: Cloud Computing Overview-Cloud Components-Infrastructure-Services-Applications-Storage-Database Services-Intranets and the cloud-Components – Hypervisor Applications. First Movers in the Cloud: Amazon- Google-Microsoft.	15
Unit II	Organization and Cloud Computing-Benefits-Limitations of Cloud Computing- Security Concerns-Privacy concerns with a third party-Security Benefits.	15
Unit III	Cloud Computing Technology : Hardware and Infrastructure-Clients-Security-Network-Services-Accessing the cloud-Platforms-Web APIs-Web Browsers-Cloud Storage-Overview- Cloud Storage Providers -Standards	15
Unit IV	Cloud Computing with the Titans: Google - Google App Engine -Google Web tool kit-EMC Technologies-VMware Acquisition- Microsoft -Azure Services Platform-Windows live-Exchange online-Sharepoint Services-Microsoft Dynamics CRM- Amazon -Amazon Elastic Compute Cloud-Amazon Simple Storage Service- Amazon Simple Queue Service -Salesforce.com- IBM .	15
Unit V	Security Concerns in Cloud Computing- <i>Threats in Cloud Computing</i> .	15
	Total Contact Hrs	75

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Anthony T. Velte, Toby J. Velte, Robert Elsenpeter	Cloud Computing-A Practical Approach	Mc Graw Hill Publications (Unit 1 to 5)	2010

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dr. Kumar Saurabh	Cloud Computing	Wiley India, Second Edition	2012

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC6E6			Title	Batch:	2021-2024
Lecture Hrs./Week	5	Tutorial Hrs./Sem		Core Elective - III : Nano Computing	Semester:	VI
					Credits:	05

Course Objective

This course is intended to provide the students with the prospects, challenges, imperfections, reliability and with insight into Nanoscale Quantum Computing and QCA implementation.

Course Outcomes (CO)

Upon completion of this course students shall be able to

CO Number	Co Statement	Knowledge Level
CO1	Understand the concepts of Nano computing	K1
CO2	Discuss Nano computing challenges and imperfections	K2
CO3	Apply reliability evaluation strategies	K3
CO4	Analyze nano scale quantum computing	K4
CO5	Explain the concept of Molecular Computing and Optimal Computing	K5

Mapping

PO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO												
CO1	H	H		H	H	H	H	H		H	H	H
CO2	M	M		M	M	M		H			M	M
CO3	H	H		H		M	H	M	H	H	H	H
CO4	M	M		M	M	M	M	H	M	H	H	H
CO5	M	M		M	H	H	M				M	M

Units	Content	Hrs
Unit I	NANOCOMPUTING-PROSPECTS AND CHALLENGES Introduction - History of Computing - Nanocomputing - Quantum Computers - Nanocomputing Technologies - Nano Information Processing - Prospects and Challenges - Physics of Nanocomputing : Digital Signals and Gates - Silicon Nanoelectronics - Carbon Nanotube Electronics - Carbon Nanotube Field-effect Transistors – Nanolithography	15
Unit II	NANOCOMPUTING WITH IMPERFECTIONS Introduction - Nanocomputing in the Presence of Defects and Faults - Defect Tolerance - Towards Quadrillion Transistor Logic Systems	15
Unit III	RELIABILITY OF NANOCOMPUTING Markov Random Fields - Reliability Evaluation Strategies - NANOLAB - NANOPRISM - Reliable Manufacturing and Behavior from Law of Large Numbers	15
Unit IV	NANOSCALE QUANTUM COMPUTING Quantum Computers - Hardware Challenges to Large Quantum Computers - Fabrication, Test, and Architectural Challenges - Quantum-dot Cellular Automata (QCA) - Computing with QCA - QCA Clocking - QCA Design Rules	15
Unit V	QCADESIGNER SOFTWARE AND QCA IMPLEMENTATION Basic QCA Circuits using QCA Designer - QCA Implementation - Molecular and Optical Computing: Molecular Computing - Optimal Computing - Ultrafast Pulse Shaping and Tb/sec Data Speeds	15
	Total Contact Hrs	75

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, Assignment, Case Study

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Sahni V. and Goswami D	Nano Computing	McGraw Hill Education Asia Ltd	2008

Reference Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Sandeep K. Shukla and R. Iris Bahar	Nano, Quantum and Molecular Computing	Kluwer Academic Publishers	2004
2	Sahni V	Quantum Computing	McGraw Hill Education Asia Ltd	2007
3	Jean-Baptiste Waldner	Nanocomputers and Swarm Intelligence	John Wiley & Sons	2008

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications		
Course Code:	21UBC626			Title	Batch:	2021-2024	
Practical Hrs./Week	4	Tutorial Hrs./Sem.		Core Lab - XI : Python Programming	Semester:	VI	
					Credits:	02	

Course Objective

The course presents an overview of elementary data items, list, dictionaries and oops concepts.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the Python language syntax including control statements, loops and functions	K3
CO2	Interpret the concepts of Object-oriented programming as used in Python using encapsulation, polymorphism and inheritance	K4
CO3	Identify the external modules for creating and writing data to excel files and inspect the file operations to navigate the file systems.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	H	H	M		M	M					M	H
CO2	H	H		H	M	M	M	M	H	H	M	H
CO3	H	H			M	M		H	H	H	H	H

1. Write a program to display the following information: Your name, Full address, Mobile number, College name, Course.
2. Write a program to find the largest three integers using if-else and conditional operator.
3. Write a program to find the product of two matrices.
4. Write a program to find the GCD of two integers.
5. Write a program to print the Fibonacci sequence.
6. Write a GUI program that converts Celsius temperature to Fahrenheit temperature.
7. Write a GUI program that displays your details when a button is clicked.
8. Write a program that opens a specified text file and then displays a list of all unique words Found in the file.
9. Write a program to implement the inheritance and polymorphism.
10. Write a program to display prime number.

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC627			Title	Batch:	2021 - 2024
Practical Hrs./Week	4	Tutorial Hrs./Sem.		Core Lab - XII : Mobile Application Development	Semester:	VI
					Credits:	02

Course Objective

To design and implement various mobile applications and learn how to deploy applications to hand-held devices.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Build a native application using GUI components and Mobile application development framework.	K3
CO2	Learn how to develop and deploy an application to the app market.	K4
CO3	Develop useful mobile applications for the current scenario.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
CO1	H	M		M	H	H	M	H	M	H	H	H
CO2	M	H	M	H	H	M		H	M		H	M
CO3	M	M		M	H	M		H	M		M	M

1. Write a program to implement the Activities on ANDROID
2. Write a program to implement the Intent Filters using ANDROID
3. Write a program to implement the User Interface using ANDROID
4. Write a program to implement the Image views using ANDROID
5. Write a program to implement the location tracking using ANDROID
6. Write a program to store the data in SD Card using ANDROID
7. Write a program to implement the Content Providers using ANDROID
8. Write a program to implement the SMS Messaging using ANDROID
9. Write a program to create a database to store the values using ANDROID
10. Write a program to create a database to store and retrieve the images using ANDROID

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC6S3			Title	Batch:	2021-2024
Lecture Hrs./Week	3	Tutorial Hrs./Sem.		Skill Enhancement Course (SEC) IV: Naan Mudhalvan : Interview Readiness	Semester:	VI
					Credits:	02

Course Objective

To develop the student broad career plans, evaluate the employment market, identify the organizations to get good placement, match the job requirements and skill sets.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the communication and interpersonal skills.	K1
CO2	Understand the abilities and competencies.	K2
CO3	Apply the concept of strengthening the skills.	K3
CO4	Analyze the Technical and Case Interviews.	K4
CO5	Evaluate the interview challenges and utilize them for future purpose.	K5

Mapping

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO												
CO1	H	H			H					H	M	H
CO2		H		M	H	M				H		H
CO3			M		H				M	H		H
CO4	M	M			H	M	M	H	H	H	H	H
CO5		M			H			M	M	H	M	H

Units	Content	Hrs
Unit I	Interview Process: Introduction to different types of interviews - Importance of interview preparation- Stages of the interview process -Written test –Common interview formats and structures-Role of body language and - communication in interviews	9
Unit II	Mastering Behavioral Interviews : Understanding the STAR (Situation, Task, Action, Result) method - Analyzing common behavioral interview questions - Crafting impactful stories to showcase our abilities –Addressing competency-based questions with confidence-Handling challenging behavioral questions and turning them to our advantage.	9
Unit III	Crafting our Personal Brand: Identifying your strengths, skills, and experiences - Developing a compelling elevator pitch - Creating a strong online presence - Aligning our personal brand with the job seeking-Showcasing our achievements and projects effectively.	9
Unit IV	Excelling in Technical and Case Interviews: Preparing for technical assessments and coding challenges - Reviewing key technical concepts relevant to the role - Approaches to solving case interview questions – Developing structured frameworks for analyzing cases - Presenting Logical and organized solutions during the interview.	9
Unit V	Navigating Common Interview Challenges: Handling nerves and anxiety before and during interviews - Addressing gaps in our resume or experience - Responding to tricky questions or unexpected scenarios - Negotiating salary, benefits, and other job offer components- Seeking and providing effective feedback after interviews.	9
	Total Contact Hrs	45

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar,PowerPoint Presentation,Chalk and talk,Quiz,Assignments,GroupTask.
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TextBook

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	Barun K.Mitra	Personality Development and soft skills	Oxford University Press	2011
2	Patrick McName	Success in Interviews: How to succeed in any job interview	PBMCN Publishers	2011
3	James Storey	The Art of the Interview: The perfect answers to every Interview question	Online Publication	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
1	<u>Nitin Bhatnagar</u>	Effective Communication and Soft Skills	Pearson Education in India	2011

Programme Code:	BCA			Programme Title:	Bachelor of Computer Applications	
Course Code:	21UBC6S4			Title	Batch:	2021-2024
Lecture Hrs./Week	3	Tutorial Hrs./Sem		Skill Enhancement Course: A 360° Interview Preparation Course	Semester:	VI
					Credits:	02

Course Objective

To develop the student broad career plans, evaluate the employment strategies, identify the tricks to get good placement, match the job requirements and skill sets.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the types of interviews and companies.	K1
CO2	Understand the personal capabilities.	K2
CO3	Apply the concept of tackling situations.	K3
CO4	Analyze the Technical and Case Interviews.	K4
CO5	Evaluate the confidence and bouncing back.	K5

Mapping

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO												
CO1	H	H			H					H	M	H
CO2		H		M	H	M				H		H
CO3			M		H				M	H		H
CO4	M	M			H	M	M	H	H	H	H	H
CO5		M			H			M	M	H	M	H

Units	Content	Hrs
Unit I	Inside Interviews: What to Expect- Different types of interviews we might encounter –Written test –Why researching the company is a big deal- What interviewers want to see in candidates –Learning about behavior, tech, and other types of interviews - Making a plan to do well in any interview.	9
Unit II	Creating Your Professional Image: Finding what we're good at and what we want - Making a personal pitch that stands out - Setting up our online presence - Making sure our image fits the job we want - Telling stories that show off what we've done.	9
Unit III	Acing Questions: How to answer with STAR: Situation, Task, Action, Result – Understanding different questions they might ask-Sharing interesting stories about our self - What to do when they ask tricky situations - Practicing different scenarios to be ready.	9
Unit IV	Handling Tech and Tough Situations: Getting ready for technical tests or coding questions – Remembering important technical stuff for the job –Solving tough problems and cases step by step - Explaining your solutions confidently - Doing mock interviews to stay calm under pressure.	9
Unit V	Feeling Confident and Bouncing Back: Tricks to calm your nerves before interviews -Doing mindfulness exercises for self-confidence-Dealing with common problems like gaps In your work history- Learning from things that didn't go well –Keeping a positive attitude and showing we're confident.	9
	Total Contact Hrs	45

- The topics given in **Italics** are noted as Self-Study topics.

Pedagogy and Assessment Methods:

Seminar, PowerPoint Presentation, Chalk and talk, Quiz, Assignments, Group Task.
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22UBC6S4

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Bari A. Williams	Diversity in the Workplace: Eye-opening Interviews to Jumpstart Conversations about Identity, Privilege and Bias	Rockbridge Press	2020
2	Christopher Mulligan and Craig Taylor	Talent Keepers: How top leaders engage and retain their best performers	Wiley Publications	2019

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Rhamey Alejeal	People Processes: How your people can be your organization's competitive advantage	Online Publication	2018
2	Simon Sinek	Start with Why: How great Leaders inspire everyone to take action	Portfolio Publications	2011

HOD

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