

Bachelor of



Computer Applications

SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE

(Autonomous)

[An Autonomous College Affiliated to Periyar University, Salem, Tamil Nadu]

[Accredited by NAAC with 'A' Grade with CGPA of 3.27]

[Recognized 2(f) & 12(B) Status under UGC Act of 1956]

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DEGREE OF BACHELOR OF COMPUTER APPLICATIONS
CHOICE BASED CREDIT SYSTEM (CBCS)

REGULATIONS AND SYLLABUS FOR

BCA PROGRAMME

(SEMESTER PATTERN)

**(For Students Admitted in the College from the
Academic Year 2020-2021 Onwards)**



Programme Outcomes (POs)

PO1	To provide thorough understanding of nature, scope and application of computer and computer languages.
PO2	Effectively communicate business issues, management concepts, plans and decisions both in oral and written form using appropriate supportive technologies.
PO3	Develop various real time applications using latest technologies and programming languages.
PO4	Blend analytical, logical and managerial skills with the technical aspects to resolve real world issues.
PO5	Become employable in various IT companies and government jobs.

Programme Specific Outcomes (PSOs)

PSO1	Apply fundamental concepts and methods of Computer Science to a wide range of applications.
PSO2	Understand the basic concepts of digital fundamentals, OOP concepts, Databases, web applications and hardware related applications.
PSO3	Ability to understand the principles and working of computer systems.
PSO4	Able to understand, analyze and develop computer programs in the areas related to algorithm, system analysis, web design and networking for efficient design of computer based system.
PSO5	Ability to apply mathematical methodologies to solve computation task, model real world problem using appropriate data structure and suitable algorithm.
PSO6	Student will able to know various issues, latest trends in technology development and thereby innovate new ideas and solutions to existing problems.
PSO7	Gain knowledge and skill set in applying core concepts.
PSO8	Able to communicate effectively and to improve their competency skills to solve real time problems.
PSO9	Analyze and apply latest technologies to solve problems in the areas of computer applications.



SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE

(Autonomous)

Bachelor of Computer Applications (BCA)

Programme Pattern and Syllabus (CBCS)

(For Students Admitted in the College from the Academic Year 2020-2021 Onwards)

Sl. No	Part	Nature of Course	Course Code	Name of the Course	Hours/Week	Credits	Marks		
							CIA	ESE	Total
SEMESTER – I									
1	I	Language	20UTA1F01	Tamil – I / Other Language	5	3	25	75	100
2	II	Language	20UEN1F01	English – I	5	3	25	75	100
3	III	Core – I	20UCA1C01	Programming in Python	4	4	25	75	100
4		Core Practical – I	20UCA1P01	Programming in Python Lab	3	2	40	60	100
5		Core – II	20UCA1C02	Digital Computer Fundamentals	5	4	25	75	100
6		Allied – I	20UMA1A01	Allied Maths – I	6	4	25	75	100
7	IV	Value Education	20UVE101	Yoga	2	2	25	75	100
Total					30	22	190	510	700
SEMESTER – II									
8	I	Language	20UTA2F02	Tamil – II / Other Language	5	3	25	75	100
9	II	Language	20UEN2F02	English – II	5	3	25	75	100
10	III	Core – III	20UCA2C03	Programming in C	4	4	25	75	100
11		Core – IV	20UCA2C04	Data Structures & Algorithms	4	4	25	75	100
12		Core Practical – II	20UCA2P02	Data Structures Using C Lab	3	2	40	60	100
13		Allied – II	20UMA2A02	Allied Maths – II	6	4	25	75	100
14	IV	SBEC – I	20UCA2SP01	Office Automation Lab	2	2	40	60	100
15		Common Paper	20UES201	Environmental Studies	1	2	25	75	100
Total					30	24	230	570	800



SEMESTER – III									
16	III	Core – V	20UCA3C05	Programming in C++	5	4	25	75	100
17		Core Practical – III	20UCA3P03	Programming in C++ Lab	3	2	40	60	100
18		Core – VI	20UCA3C06	Web Technology	5	4	25	75	100
19		Core Practical –IV	20UCA3P04	Web Technology Lab	3	2	40	60	100
20		Core – VII	20UCA3C07	Operating Systems	6	4	25	75	100
21		Allied – III	20UCM3A01	Principles of Accountancy	6	4	25	75	100
22	IV	Non-Major Elective – I	---	Non Major Elective Course – I	2	2	25	75	100
Total					30	22	205	495	700
SEMESTER – IV									
23	III	Core – VIII	20UCA4C08	Relational Database Management System	4	4	25	75	100
24		Core Practical – V	20UCA4P05	Relational Database Management System Lab	3	2	40	60	100
25		Core – IX	20UCA4C09	.Net Programming	4	4	25	75	100
26		Core Practical – VI	20UCA4P06	.Net Programming Lab	3	2	40	60	100
27		Core – X	20UCA4C10	Software Engineering	5	4	25	75	100
28		Allied – IV	20UCM4A02	Cost & Management Accounting	5	4	25	75	100
29	Allied Practical – I	20UCM4AP01	Practical Lab – I	2	2	40	60	100	
30	IV	SBEC – II	20UCA4S02	Quantitative Aptitude – I	2	2	25	75	100
31		Non-Major Elective – II	---	Non Major Elective Course – II	2	2	25	75	100
Total					30	26	270	630	900
SEMESTER – V									
32	III	Core – XI	20UCA5C11	Java Programming	5	4	25	75	100
33		Core Practical – VII	20UCA5P07	Java Programming Lab	3	2	40	60	100
34		Core – XII	20UCA5C12	LINUX & Shell Programming	5	4	25	75	100



35		Core Practical – VIII	20UCA5P08	LINUX & Shell Programming Lab	3	2	40	60	100
36		Core – XIII	20UCA5C13	Computer Networks	6	4	25	75	100
37		Elective – I	---	Elective – I	6	4	25	75	100
38	IV	SBEC – III	20UCA5S03	Quantitative Aptitude – II	2	2	25	75	100
Total					30	22	205	495	700
SEMESTER – VI									
39	III	Core – XIV	20UCA6C14	PHP with MySQL	5	4	25	75	100
40		Core Practical – IX	20UCA6P09	PHP with MySQL Lab	3	2	40	60	100
41		Core – XV	20UCA6C15	Mobile Computing	5	4	25	75	100
42		Core – XVI	20UCA6C16	Computer Graphics	5	4	25	75	100
43		Elective – II		Elective – II	5	4	25	75	100
44		Project	20UCA6PR1	.Net / PHP / Android	4	5	40	60	100
45	IV	SBEC – IV	20UCA6SP04	Android Programming Lab	3	2	40	60	100
46	V	---	20UCA6EX01	Extension Activities	-	1	-	-	-
Total					30	26	220	480	700
Grand Total					180	142	1320	3180	4500

Note

CBCS – Choice Based Credit system

CIA – Continuous Internal Assessment

ESE – End of Semester Examinations

Major Elective Courses

Semester	Part	Nature of Course	Course Code	Name of the Course
V	III	Elective – I	20UCA5E01	Cyber Security
			20UCA5E02	Artificial Intelligence
			20UCA5E03	E-Commerce Technologies
VI	III	Elective – II	20UCA6E04	Data Mining
			20UCA6E05	System Administration & Maintenance
			20UCA6E06	Software Testing



Skill Based Elective Courses

Sl. No	Part	Nature of Course	Course Code	Name of the Course	Hours/Week	Credits	Marks		
							CIA	ESE	Total
SEMESTER – II									
1	IV	SBEC – I	20UCA2SP01	Office Automation Lab	2	2	40	60	100
SEMESTER – IV									
2	IV	SBEC – II	20UCA4S02	Quantitative Aptitude – I	2	2	25	75	100
SEMESTER – V									
3	IV	SBEC – III	20UCA5S03	Quantitative Aptitude – II	2	2	25	75	100
SEMESTER – VI									
4	IV	SBEC – IV	20UCA6SP04	Android Programming Lab	2	2	40	60	100

Non-Major Elective Courses

Sl. No	Part	Nature of Course	Course Code	Name of the Course	Hours/Week	Credits	Marks		
							CIA	ESE	Total
SEMESTER – III									
1	IV	Non-Major Elective – I	20UCA3N01	Basics of Computer	2	2	25	75	100
2	IV	Non-Major Elective – I	20UCA3N02	System Administration & Maintenance	2	2	25	75	100
SEMESTER – IV									
3	IV	Non-Major Elective – II	20UCA4N03	Exploring on Word	2	2	25	75	100
4	IV	Non-Major Elective – II	20UCA4N04	Basics of Internet	2	2	40	60	100



List of Extension Activities

1. National Service Scheme (NSS)
2. Youth Red Cross (YRC)
3. Physical Education (PYE)
4. Eco Club (ECC)
5. Red Ribbon Club (RRC)
6. Women Empowerment Cell (WEC)



PROGRAMME SYLLABUS



Program: Bachelor of Computer Applications (BCA)				
Core – I		Course Code: 20UCA1C01		Course Title: Programming in Python
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	4	60	4	100

Course Objectives

1. To understand the nature of Python programming.
2. To describe the core syntax and semantics of Python programming language.
3. To infer the object-oriented programming concepts in Python.
4. To understand why Python is a useful scripting language for developers.
5. To get practical knowledge of a popular programming language Python.

UNIT – I

Introduction – History of Python – Installation – Commenting – Execution Modes – Internal Working of Python – Implementation. Python Character Set – Token – Core Data Type – The print() Function – Assigning Value to a Variable – Multiple Assignments – input(), eval() Function – Formatting Number and Strings – Inbuilt Functions. Operator and Expression: Types of Arithmetic Operators: Unary, Binary – Bitwise Operators – Operator Precedence and Associativity.

UNIT – II

Decision Making Statements – if, if – else, nested if , Multi-way if-elif – else Statements. Loop Control Statements: While Loop – range() Function – for loop. Functions: Syntax and Basics of a Function –Parameters and Arguments in a Function – Local and Global Scope of a Variable – Return Statement – Recursive Functions – Lambda Function.

UNIT – III

Lists: Introduction - Creating Lists – Accessing the Elements of a List – Negative List Indices – List Slicing – Python Inbuilt Functions for List – List Comprehensions – List Methods – List and Strings – Splitting a String in List – Passing List to a Functions – Returning List from a Function.



UNIT – IV

Object Oriented Programming: Introduction – Defining Classes – The Self-Parameter and Adding Methods to a Class- Display Class Attributes and Methods – Special Class Attributes – Accessibility – The `_init_Method` (Constructor) – Passing on Object as Parameter to a Method – `_del_()` (Destructor Method) – Class Membership Tests – Method Overloading – Operator Overloading – Inheritance: Types of Inheritance – The Object Class – Subclass Accessing Attributes of Parent Class – Multiple Inheritance – Multilevel Inheritance – Method Overriding .

UNIT – V

Tuples: Creating Tuples – `tuple()` Function – Inbuilt Functions for Tuples – Indexing and Slicing – Passing Variable Length Arguments to Tuples – Sets: Creating Sets – The Python Set Class – Set Operations – Dictionaries: Basics of Dictionaries – Creating a Dictionary – Adding, Replacing and Retrieving Values – Methods of Dictionary Class.

Text Book

1. Ashok Namdev Kamthane, Amit Ashok Kamthane, “Programming and Problem Solving with PYTHON”, McGraw Hill Education (India) Private Limited, Chennai, 2018.

Reference Books

1. S. A. Kulkarni, “Problem Solving and Python Programming”, Yes Dee Publishing Pvt. Ltd., Chennai, 2017 (Anna University Regulation 2017).
2. Martin C Brown, “The Complete Reference Python”, McGraw Hill Education, Osborne, 2018.

Web Referenced

1. <http://www.python.org>
2. [http://www/python.org/doc/](http://www.python.org/doc/)
3. <http://wiki.python.org/>
4. <http://pypi.python.org/pypi>
5. <http://www/mhhe.com/kamthane/python>



Assignments

1. Write a Python program to search a name in given tuple of names.
2. Write a Python program using Dictionary to find maximum and minimum from a set of values.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand and explain Python Programming.	K1 & K2
CO2	Interpret the fundamental Python syntax and semantics.	K2 & K3
CO3	Understand the concept of scripting and the contributions of scripting languages.	K3 & K4
CO4	Articulate the Object-Oriented Programming concepts used in python.	K5
CO5	Write codes using Multiple level of organizational structures, functions, classes, modules and package.	K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	M	M	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core Practical – I		Course Code: 20UCA1P01		Course Title: Programming in Python Lab
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	3	45	2	100

Course Objectives

1. To train the students for the basics of coding and executing Python scripts.
2. To understand the various data structures available in Python programming language and apply them in solving computational problems.
3. To develop problem solving skills and their implementation through python.
4. To apply various constructs of the language for data analytics.

List of Programs

1. Programs using conditional branches and loops.
2. Programs using functions.
3. Programs using Lists and List processing.
4. Programs using exception handling.
5. Programs using classes and objects.
6. Programs using Overloading.
7. Programs using inheritance.
8. Programs using polymorphism.



Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Learn to design and implement conditional branches and loops efficient programming using python.	K1 & K3
CO2	Learn working with functions, lists and list processing.	K2 & K3
CO3	Learn to work with exception handling, classes and objects.	K3 & K4
CO4	Learn to apply overloading concepts.	K3 & K5
CO5	Learn to use inheritance and polymorphism.	K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	S
CO2	M	M	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – II		Course Code: 20UCA1C02		Course Title: Digital Computer Fundamentals
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	5	75	4	100

Course Objectives

1. Understand the Digital number system and their conversions.
2. Identify the operations of logic Gates and simplify the Boolean expressions using K-Map.
3. Comprehend the fundamental principles of simple Arithmetic Circuits.
4. Know the design and operations of Data Processing Circuits.
5. Realize the design of sequential logic circuits such as Flip Flops, Registers and Counters and its applications.
6. Gain the knowledge about the memory elements like RAM, ROM, and Magnetic Disk memories.

UNIT – I

Number Systems and Codes: Binary Number System – Binary-to-Decimal Conversion – Decimal-to-Binary Conversion – Octal Numbers – Hexadecimal Numbers – The ASCII Code – The Excess-3 Code – The Gray Code. Digital Computers.

UNIT – II

Digital Logic: The Basic Gates – NOT, OR, AND – Universal Logic Gates – NOR, NAND – AND-OR-Invert Gates. Combinational Logic Circuits: Boolean Laws and Theorems – Sum-of-Products Method – Truth Table to Karnaugh Map – Pairs, Quads, and Octets – Karnaugh Simplification – Don't-Care Conditions – Product-of-Sums Simplification.

UNIT – III

Data-Processing Circuits: 16-to-1 Multiplexer – 1-to-16 De-Multiplexer – BCD-to-Decimal Decoder – Decimal-to-BCD Encoder – Exclusive-or Gates. Arithmetic Circuits: Binary Addition – Binary Subtraction – Unsigned Binary Numbers – Sign-Magnitude Numbers – 2'S Complement Representation – 2'S Compliment Arithmetic.

**UNIT – IV**

Arithmetic Circuits: Arithmetic Building Blocks – The Adder – Subtractor. Flip-Flops: RS Flip-Flops – Edge-Triggered D Flip-Flops – Edge triggered JK Flip-Flops – JK Master-Slave Flip-Flops.

UNIT – V

Registers: Serial-In Serial-Out – Serial-In Parallel-Out – Parallel-In Serial-Out – Parallel-In Parallel-Out (54/74174). Memory: Introduction – Magnetic Memory – Optical Memory.

Text Book

1. Donald P Leach, Albert Paul Malvino and Goutam Saha, “Digital Principles and Applications,” 8th Edition, TMH, 2006.

Reference Books

1. Morris Mano, "Digital Logic and Computer Design," 4th Edition, Pearson, 2008.
2. Thomas C Bartee, "Digital Computer Fundamentals," 6th edition, McGraw-Hill, 1985.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the Number system and conversion from one system to another system.	K1 & K2
CO2	Understand the functional concepts of Logic gates.	K1, K2 & K3
CO3	Analyze the concept of Boolean Algebra and Simplifying the Boolean expression.	K3 & K4
CO4	Applying the knowledge to perform arithmetical operations using Logical circuit.	K4 & K5
CO5	Gain the Knowledge about memory Elements.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create



Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	M
CO2	S	M	S	S	M
CO3	S	S	S	S	M
CO4	S	M	S	S	S
CO5	M	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – III		Course Code: 20UCA2C03		Course Title:
				Programming in C
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	4	60	4	100

Course Objectives

1. To understand the nature of C programming.
2. To describe the core syntax and semantics of C programming language.
3. To develop logics which will help to create programs, applications in C.
4. To implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems.
5. To help students to get the practical knowledge of a programming language C.

UNIT – I

Overview of C: History of C – Importance of C – Basic Structure of C Programs. Constants, Variables and Data Types: Character Set – C Tokens – Keywords and Identifiers – Constants – Variables – Declaration of Storage Classes – Assigning Values to Variables- Defining Symbolic Constants. Operators and Expression – Evaluation of Expressions – Precedence of Arithmetic Operators – Type Conversions in Expressions – Operator Precedence and Associativity – Mathematical Functions. Managing Input and Output Operations: Reading and Writing a Character – Formatted Input and Output.

UNIT – II

Decision Making and Branching: Simple IF, IF-ELSE, Nesting of IF-ELSE, ELSE-IF Ladder, Switch Statements – GOTO Statements. Decision Making and Looping: WHILE Statement – DO Statement – FOR Statement – Jumps in Loops. Arrays: Definition & Declaration – One Dimensional – Two Dimensional – Multi Dimensional Arrays – Dynamic Arrays.



UNIT – III

Character Arrays and Strings: Introduction – Declaring and Initializing String Variables – Reading Strings from Terminal – Writing Strings to Screen – String Handling Functions – Table of Strings. User – Defined Functions: Introduction – Need for User – Defined Function – A Multi- Function Program – Elements of User – Defined Function – Definition of Functions – Return Values and Their Types – Function Calls – Function Declaration – All Category of Functions – Nesting of Functions – Recursion – Passing Arrays to Functions – Passing Strings to Function.

UNIT – IV

Structures and Unions: Introduction – Defining a Structure – Declaring Structure Variables – Accessing Structure Members – Structure Initialization – Copying and Comparing Structure Variables – Arrays of Structures – Arrays within Structures – Structures within Structures – Structures and Functions – Unions – Size of Structures – Bit Fields.

Pointers: Introduction – Understanding Pointers – Accessing the Address of a Variable – Initializing of Pointer Variables. Chain of Pointers – Pointer Expressions – Pointers and Arrays – Pointers and Character Strings – Arrays of Pointers – Pointers as Function Arguments – Functions Returning Pointers – Pointers to Functions – Pointer and Structures.

UNIT – V

File Management: Introduction – Defining and Opening a File – Closing a File – Input/ Output Operation on Files – Error Handling During I/O Operations – Random Access Files – Command Line Arguments.

Text Book

1. E. Balgurusamy, “Programming in ANSI C”, 5th Edition, Tata McGraw Hill, New Delhi, 2010.

Reference Books

1. Herbert Schildt, “C: The Complete Reference”, 4th Edition, McGraw Hill, 2003.
2. B.L.Juneja, “Programming in C”, 1st Edition, Cengage Learning, 2012.



Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand and explain C Programming.	K1 & K2
CO2	Able to define data types and use them in simple data processing applications.	K2 & K3
CO3	Analyze programming problems to choose when regular loops should be used and when recursion will produce a better program.	K3 & K4
CO4	Design, implement, test and debug programs that use arrays for character strings and that use pointers for character strings.	K3, K4 & K5
CO5	Develop solutions to problems using C programming.	K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	M	S	S	S
CO3	S	S	S	S	S
CO4	M	S	S	S	S
CO5	S	S	M	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – IV		Course Code: 20UCA2C04		Course Title: Data Structures & Algorithms
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	4	60	4	100

Course Objectives

1. To have fundamental knowledge about data and the way it is stored.
2. To educate the concepts of fundamentals of writing algorithms and approach in problem solving.
3. To understand the concepts like stacks, queues, lists and its structures.
4. To know the concepts of Trees, Tree Traversals and Graphs.
5. To develop some applications using data structures.

UNIT – I

Algorithms (Analysis and Design): Problem Solving – Top-Down and Bottom-Up Approaches to Algorithm Design – Use of Algorithms in Problem Solving – Design, Implementation, Verification of Algorithm – Efficiency Analysis of Algorithms: Space, Time Complexity, and Frequency Count – Sample Algorithms: Exchange the Value of Two Variables – Summation of Set of Numbers – Decimal to Binary Conversion – Sorting – Factorial – Fibonacci – Finding a Largest Number in an Array – Reverse the Order of Elements in Array.

UNIT – II

Introduction: Definitions – Concepts – Overview – Implementation of Data Structures. Arrays: Definition – Terminology – One Dimensional Array – Multi Dimensional Array. Stacks: Introduction – Definition – Representation of Stacks – Operations on Stacks – Applications of Stack: Evaluation of Arithmetic Expression – Implementation of Recursion- Factorial Calculation

**UNIT – III**

Queues: Introduction – Definition – Representation of Queues – Various Queue Structures: Circular Queue – De-Queue – Priority Queue – Applications of Queues: CPU Scheduling. Linked List: Definition – Single Linked List – Double Linked List – Circular Double Linked List – Applications: Sparse Matrix – Polynomial Representation – Dynamic Storage Management – Boundary Tag System – Buddy System .

UNIT – IV

Trees: Terminologies – Definitions & Concepts – Representation of Binary Tree – Operations on Binary Tree – Types of Binary Trees: Expression Tree – Binary Search Tree – Heap Tree – Red Black Tree.

Graphs: Introduction – Graph Terminologies – Representation of Graphs – Operations on Graphs.

Applications of Graph: Shortest Path Problem – Topological Sorting – Minimum Spanning Tree: Kruskal and Prims Algorithm.

UNIT – V

Searching: Terminologies – Linear Search Techniques with – Array, Linked List, and Ordered List – Binary Search – Non Linear Search – Binary Tree Searching – Binary Search Tree Searching. Sorting: Terminologies – Sorting Techniques – Insertion Sort – Selection Sort – Bubble Sort – Quick Sort – Merge Sort.

Text Books

1. Sathish Jain, Shashi Singh, "Data Structure Made Simple", BPB Publications, 1st Edition, New Delhi, 2006.
2. Debasis Samanta, "Classic Data Structures", PHI Learning, New Delhi, 2nd Edition, 2009.

Reference Books

1. Aprita Gopal, "Magnifying Data Structures", PHI Learning, New Delhi, 1st Edition, 2010.
2. Chitra A & Rajan PT, "Data Structures", Vijay Nicole Publications, 2nd Edition, 2016.
3. Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structure", Galgotia Publications, New Delhi, 1985.



4. Ellis Horowitz and Sartaj Sahni, “Fundamentals of computer algorithms”, Galgotia Publications, New Delhi, 1985.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the representations of data and various algorithms.	K1 & K2
CO2	Analyze the complexity of different algorithms.	K2 & K3
CO3	Remember the concept of algorithms for searching, sorting and dynamic programming.	K1, K2 & K3
CO4	Adapting the algorithmic concepts and implement new ones.	K4 & K5
CO5	Apply appropriate algorithms and data structure for real time.	K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	S
CO2	S	M	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	M

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core Practical – II		Course Code: 20UCA2P02		Course Title: Data Structures Using C Lab
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	3	45	2	100

Course Objectives

1. To train the students for the basics of coding and executing C Programming using data structures.
2. To understand how to implement various data structures in C Programming language and apply them in solving computational problems.
3. To implement the applications of stacks and queues using arrays and pointer in C program.
4. To perform some real time applications like searching, sorting in C program using the application of data structures.

List of Programs

1. Implement Push and Pop Operations of a Stack using Array.
2. Write a program to perform factorial calculation using recursion.
3. Implement Add and Delete Operations on Queue using Pointer.
4. Implement Add and Delete Operations on Circular Queue.
5. Write a Program to convert an Infix Expression to Postfix Expression using Arrays.
6. Write a Program to add Two Polynomials using Pointers.
7. Perform Tree Traversals for a Binary Tree using Recursion.
8. Write a program to perform Binary Search.
9. Sort the given list of numbers using Heap Sort.
10. Sort the given list of numbers using Quick Sort.



Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand and basics of coding and executing the C program using data structures.	K1 & K2
CO2	Understand the various data structures and implement them using C program.	K2 & K3
CO3	Implement the applications of stacks and queues and solving the problems in C.	K3 & K4
CO4	Choose the appropriate concept of data structure to solve the complex problems in C program	K5
CO5	Try to develop a solution to solve the real time problems using any type of data structure.	K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	M	S	S	S	M

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – V		Course Code: 20UCA3C05		Course Title: Programming in C++
Semester III	Hours/Week 5	Total Hours 75	Credits 4	Total Marks 100

Course Objectives

1. To understand how C++ improves C with object-oriented features.
2. To describe the core syntax and semantics of C++ programming language.
3. To develop logics which will help to create programs, applications in C++.
4. To implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems.
5. To help students to get the practical knowledge of a programming language C++.

UNIT – I

Object-Oriented Programming: Principles – Benefits of OOP – Application of OOP – Tokens, Expression and Control Structures: Tokens – Keywords – Identifiers and Constants – Data Types – Constants – Variables – Operators – Manipulators – Expressions – Control Structure.

UNIT – II

Functions – Prototyping – Call by Reference – Return by Reference – Inline Functions – Default Arguments – const Arguments – Function Overloading – Friend and Virtual Functions, Classes and Objects – Class – Member Functions – Arrays with in a Class – Memory Allocation for Objects – Static data members – Static member functions – Arrays of Objects – Objects as Function Arguments – Friendly Functions – Returning Objects – const Member Functions – Pointers to Members, Constructors and Destructors.

UNIT – III

Operator Overloading and Type Conversions, Inheritance: Extending Classes – Derived Classes – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract Classes, Pointers, Virtual



Functions and Polymorphism: Pointers – Pointers to Objects – this Pointer – Pointers to Derived Classes – Virtual Functions – Pure Virtual Functions.

UNIT – IV

Managing I/O Operations: C++ Streams – C++ Stream Classes – Unformatted I/O and Formatted I/O Operations – Managing Output with Manipulators, Working with Files: Classes for File Stream Operations – Opening and Closing a File – Detecting end-of-file – File Pointers and Their Manipulators – Sequential I/O Operations – Updating a File – Error Handling during File Operations – Command Line Arguments

UNIT – V

Templates: Class Templates – Class Templates with Multiple Parameters – Function Templates – Function Templates with Multiple Parameters – Overloading of Template Functions – Member Function Templates – Non-Type Template Arguments, Exception Handling: Basics – Exception Handling Mechanism – Throwing Mechanism – Catching Mechanism – Re-throwing an Exception – Specifying Exceptions.

Text Book

1. E.Balagurusamy, “Object Oriented Programming with C++”, Tata McGraw Hill Publications, 5th Edition, 2011.

Reference Books

1. M.T. Somashekara, “Object Oriented programming with C++”, Prentice Hall of India Learning Limited, 2nd Edition, 2012.
2. Behrouz A.Forouzan, “A Structured Approach Using C++”, Cengage Learning, 2nd Edition, 2003.



Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand basic object oriented programming concepts.	K1 & K2
CO2	Able to define data types and use them in simple data processing applications.	K2 & K3
CO3	To design, implement, debug and test programs using the fundamental elements of C++.	K3 & K4
CO4	Implement programming techniques to solve problems in the C++ programming language.	K3 & K5
CO5	Apply the concepts and principles of the programming language to the real-world problems.	K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	M	S	S	S
CO3	S	S	S	S	S
CO4	M	S	S	S	S
CO5	S	S	M	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core Practical – III		Course Code: 20UCA3P03		Course Title: Programming in C++ Lab
Semester	Hours/Week	Total Hours	Credits	Total Marks
III	3	45	2	100

Course Objectives

1. To learn the fundamental C++ programming concepts
2. To train the students for the basics of coding and executing C++
3. To code, document, test, and implement a well-structured, robust computer program using the C++ programming language.
4. To write reusable modules (collections of functions).

List of Programs

1. Write a C++ Program to create a class ARITHMETIC which consists of a FLOAT and an INTEGER variable. Write member functions ADD(), SUB(), MUL(), DIV() to perform addition, subtraction, multiplication, division respectively. Write a member function to get and display values.
2. Write a C++ Program to create a class that contains one float data member. Overload all the four Arithmetic operators so that they operate on the object FLOAT.
3. Write a C++ Program to create a class for STRING. Write a Member Function to initialize, get and display strings. Overload the operators ++ and == to concatenate two Strings and to compare two strings respectively.
4. Write a C++ Program to create class, which consists of EMPLOYEE Detail like E_Number, E_Name, Department, Basic, Salary, Grade. Write a member function to get and display them. Derive a class PAY from the above class and write a member function to calculate DA, HRA and PF depending on the grade.
5. Write a C++ Program to create a class SHAPE which consists of two VIRTUAL FUNCTIONS Calculate_Area() and Calculate_Perimeter() to calculate area and perimeter of various figures. Derive three classes SQUARE, RECTANGLE, TRIANGLE



from class Shape and Calculate Area and Perimeter of each class separately and display the result.

6. Write a C++ Program using Function Overloading to read two Matrices of different Data Types such as integers and floating point numbers. Find out the sum of the above two matrices separately and display the sum of these arrays individually.
7. Write a C++ Program to Convert an Infix Expression to Postfix Expression using Arrays.
8. Write a C++ Program to create a class to implement the data structure STACK. Write a constructor to initialize the TOP of the STACK. Write a member function PUSH() to insert an element and member function POP() to delete an element. Check for overflow and underflow conditions.
9. Write a C++ Program to check whether the given string is a palindrome or not using Pointers.
10. Write a C++ Program to merge two files into a single file.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	To design, implement, debug and test programs using the fundamental elements of C++.	K1 & K3
CO2	Analyze the given problem statements to create basic program designs.	K2 & K3
CO3	Implement different functions for input and output, various data types, basic operators, files and functions.	K3 & K4
CO4	Implement programming techniques to solve problems in the C++ programming language.	K3, K4 & K5
CO5	To learn how to design C++ classes for code reuse.	K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create



Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	S
CO2	M	M	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – VI		Course Code: 20UCA3C06		Course Title: Web Technology
Semester	Hours/Week	Total Hours	Credits	Total Marks
III	5	75	4	100

Course Objectives

1. To understand the structuring documents for the web.
2. To understand website development in a user friendly manner.
3. To improve the visual design and content structuring.
4. To gain the skills and project-based experience needed for entry into web application and development careers.

UNIT – I

Structuring Documents for the Web: Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups. Links and Navigation: Basic Links, Creating Links with the <a> Element, Advanced E- mail Links. Images, Audio, and Video: Adding Images Using the Element, Using Images as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your Webpages.

UNIT – II

Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables. Forms: Introducing Forms, Form Controls, Sending Form Data to the Server. Frames: Introducing Frameset, <frame> Element, Creating Links Between Frames, Setting a Default Target Frame Using <base> Element, Nested Framesets, Inline or Floating Frames with <iframe>.

UNIT – III

Cascading Style Sheets: Introducing CSS, Where you can Add CSS Rules. CSS Properties: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the



Box Model. More Cascading Style Sheets: Links, Lists, Tables, Outlines, The :focus and :activate Pseudo classes Generated Content, Miscellaneous Properties, Additional Rules, Positioning and Layout wit, Page Layout CSS , Design Issues.

UNIT – IV

Java Script: How to Add Script to Your Pages, Variables and Data Types – Statements and Operators, Control Structures, Conditional Statements, Loop Statements – Functions – Message box, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes.

UNIT – V

Working with JavaScript: Practical Tips for Writing Scripts, JavaScript Objects: Window Object – Document Object – Browser Object – Form Object – Navigator Object Screen object – Events, Event Handlers, Forms – Validations, Form Enhancements, JavaScript Libraries.

Text Book

1. Jon Duckett, Beginning HTML, XHTML, CSS and JavaScript, Wiley Publishing, 2009.

References Books

1. Chris Bates, “Web Programming”, Wiley Publishing, 3rd Edition, 2007.
2. M. Srinivasan, “Web Technology: Theory and Practice”, Pearson Publication, 2012.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the uses of HTML Tags.	K1 & K2
CO2	Learning and implementing CSS.	K2 & K3
CO3	Understanding the concepts of scripting languages.	K1, K2 & K3
CO4	Make the web pages more dynamic and interactive.	K2, K3, K4 & K5



CO5	Designing and developing web pages.	K5 & K6
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K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	M	S	S	S	S
CO3	S	S	S	S	S
CO4	S	M	S	S	S
CO5	S	M	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core Practical – IV		Course Code: 20UCA3P04		Course Title: Web Technology Lab
Semester	Hours/Week	Total Hours	Credits	Total Marks
III	3	45	2	100

Course Objectives

1. To understand the structuring documents for the web.
2. To understand website development in a user friendly manner.
3. To improve the visual design and content structuring.
4. To gain the skills and project-based experience needed for entry into web application and development careers.

List of Programs

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form.
2. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the textboxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textboxes has been left empty, popup an alert indicating which textbox has been left empty.
3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.
4. Create a page with dynamic effects. Write the code to include layers and basic animation.
5. Write a JavaScript code to find the sum of N natural Numbers. (Use user defined function)
6. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
7. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
8. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.



9. Create a form consists of a two Multiple choice lists and one single choice list
 - a. (a)The first multiple choice list, displays the Major dishes available
 - b. (b)The second multiple choice list, displays the Starters available.
 - c. (c)The single choice list, displays the Soft drinks available.
10. Create a web page using two image files, which switch between one another as the mouse pointer moves over the image. Use the on Mouse Over and on Mouse Out event handlers.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the uses of HTML Tags.	K1 & K2
CO2	Learning and implementing CSS.	K2 & K3
CO3	Understanding the concepts of scripting languages.	K1, K2 & K3
CO4	Make the web pages more dynamic and interactive.	K2, K3, K4 & K5
CO5	Designing and developing web pages.	K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	M	S	S	S	S
CO3	S	S	S	S	S
CO4	S	M	S	S	S
CO5	S	M	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – VII		Course Code: 20UCA3C07		Course Title: Operating System
Semester	Hours/Week	Total Hours	Credits	Total Marks
III	6	90	4	100

Course Objectives

1. To obtain knowledge about Operating System overview.
2. To impart the basic commands in shell programming.
3. To know about process and threads.
4. To understand the concepts of Deadlock, Concurrency and Semaphores.
5. To understand the basic concepts in file management.

UNIT – I

Introduction – History of Operating System – Different Kinds of Operating System – Operation System Concepts – System Calls – Operating System Structure.

UNIT – II

Processes and Threads: Processes – Threads – Thread Model and Usage – Inter Process Communication.

UNIT – III

Scheduling – Memory Management: Memory Abstraction – Virtual Memory – Page Replacement Algorithms.

UNIT – IV

Deadlocks: Resources – Introduction to Deadlocks – Deadlock Detection and Recovery – Deadlocks Avoidance – Deadlock Prevention. Multiple Processor System: Multiprocessors – Multi-Computers.

**UNIT – V**

Input/Output: Principles of I/O Hardware – Principles of I/O Software. Files Systems: Files – Directories – Files Systems Implementation – File System Management and Optimization.

Text Book

1. Andrew S. Tanenbaum, “Modern Operating Systems”, PHI Private Limited, New Delhi, 2nd Edition, 2008.

Reference Books

1. William Stallings, “Operating Systems – Internals & Design Principles”, Prentice – Hall of India Private Ltd., New Delhi, 5th Edition, 2004.
2. Sridhar Vaidyanathan, “Operating System”, Vijay Nicole Publications, 1st Edition, 2014.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the structure of OS and basic architectural components involved in OS design.	K1 & K2
CO2	Understand what a process is and how process are synchronized and schedule.	K2 & K3
CO3	Understand the concepts like deadlock, memory management and file management.	K2, K3 & K4
CO4	Analyze the need for scheduling algorithms.	K4 & K5
CO5	Demonstrate an understanding of different I/O technique in OS.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create



Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	M	S
CO2	M	M	S	S	S
CO3	M	S	S	S	S
CO4	M	S	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – VIII	Course Code: 20UCA4C08		Course Title: Relational Database Management System	
Semester IV	Hours/Week 4	Total Hours 60	Credits 4	Total Marks 100

Course Objectives

1. To understand the concepts of Database concepts.
2. To understand the concepts of Relational Calculus.
3. To develop the logical design of the database using data modeling concepts such as entity-relationship diagrams.
4. To develop programming skills in PL/SQL.
5. To create a relational database using a relational database package, function and trigger.

UNIT – I

Introduction: Database System Applications – DBMS Vs. File System – View of Data – Data Model – Database Languages – Database users and Administrators – Transaction Management – Database System Structure – Application Architecture. Data Models: Basic Concepts – Constraint – Keys – ER Diagram – Weak Entity – Extended ER Features - Design of an ER Schema.

UNIT – II

Relational Model: Structure of Relational Databases – Relational Algebra. SQL: Background–Basic Structure – Set Operation – Aggregate Function – Null Values – Nested Sub Queries – Views – Modification of the Database – Data Definition Language – Embedded SQL – Dynamic SQL.

UNIT – III

Data Normalization: Pitfalls in Relational Database Design – Decomposition – Functional Dependencies – Normalization – First Normal Form – Second Normal Form – Third Normal



Form – Boyce-Codd Normal Form – Fourth Normal Form – Fifth Normal Form – Denormalization – Database Security: Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges – Data Encryption.

UNIT – IV

PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment Operation – Bind Variables – Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control Statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF Clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.

UNIT – V

PL/SQL Composite Data Types: Records – Tables – Varrays. Named Blocks: Procedures – Functions – Packages – Triggers – Data Dictionary Views. .

Text Books

1. A Silberschatz, H Korth, S Sudarshan, “Database System and Concepts”, McGraw-Hill, 5th Edition, 2005.
2. Alexis Leon & Mathews Leon, “Fundamentals of DBMS”, Vijay Nicole Publications, 2nd Edition, 2014.
3. Nilesh Shah, “Database Systems Using Oracle”, PHI, 2nd edition, 2004

Reference Book

1. Alexis Leon & Mathews Leon, “Essential of DBMS”, Vijay Nicole Publications, 2nd Reprint, 2009.



Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand database concepts, structures and E-R Model.	K1 & K2
CO2	Understand the relational model and relational algebra operations.	K2
CO3	Normalize the relational tables applying normalization rules.	K2 & K3
CO4	Perform PL/SQL programming using concept of Cursor Management, Error Handling, Package and Trigger.	K2, K3 & K4
CO5	Apply PL/SQL procedural interfaces statement on relational tables as per requirements.	K4, K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	M	M	S	S	S
CO3	M	M	S	S	S
CO4	M	S	S	S	S
CO5	M	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core Practical – V		Course Code: 20UCA4P05		Course Title: Relational Database Management System Lab
Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	3	45	2	100

Course Objectives

1. To understand the concepts of Database concepts.
2. To understand the concepts of Relational Calculus.
3. To develop the logical design of the database using data modeling concepts such as entity-relationship diagrams.
4. To develop programming skills in PL/SQL.
5. To create a relational database using a relational database package, function and trigger.

List of Programs

1. Data Definition of Base Tables.
2. DDL with Primary key constraints.
3. DDL with constraints and verification by insert command.
4. Data Manipulation of Base Tables and Views.
5. Demonstrate the Query commands.
6. Write a PL/SQL code block that will accept an account number from the user and debit an amount of Rs. 2000 from the account if the account has a minimum balance of 500 after the amount is debited. The Process is to fired on the Accounts table.
7. Write a PL/SQL code block to calculate the area of the circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in a table Areas. Areas – radius, area.
8. Write a PL/SQL block of code for reversing a number. (Example: 1234 as 4321).
9. Create a transparent audit system for a table Client_master (client_no, name, address, Bal_due). The system must keep track of the records that are being deleted or updated. The functionality being when a record is deleted or modified the original record details



and the date of operation are stored in the auditclient(client_no, name, bal_due, operation, userid, update) table, then the delete or update is allowed to go through.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand database concepts, structures and E-R Model.	K1 & K2
CO2	Understand the relational model and relational algebra operations.	K2
CO3	Normalize the relational tables applying normalization rules.	K2 & K3
CO4	Perform PL/SQL programming using concept of Cursor Management, Error Handling, Package and Trigger.	K2, K3 & K4
CO5	Apply PL/SQL procedural interfaces statement on relational tables as per requirements.	K4, K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	M	M	S	S	S
CO3	M	M	S	S	S
CO4	M	S	S	S	S
CO5	M	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – IX		Course Code: 20UCA4C09		Course Title: .Net Programming
Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	4	60	4	100

Course Objectives

1. Creates web based applications using . net frameworks.
2. Use different server controls to create rich user interactive websites.
3. Access data from the database in data bound controls on the web page.
4. Apply master page to different pages in the website.

UNIT – I

The .NET Framework – Learning the .NET languages – Introduction – .Net Revolution – .Net Framework and its Architecture – CLR – What is Assembly – Components of Assembly – DLL Hell and Assembly Versioning – Objects and Namespaces – Setting Up ASP.NET and IIS.

UNIT – II

Developing VB.NET Applications – Introduction to VB.Net, The .Net Frame Work and Common Language Runtime, Building VB. Net Application, VB IDE, Forms, Properties, Events, VB Language - Console Application and 46 Windows Application, Data Type, Declaring Variable, Scope of Variable, Operators and Statements - Windows Applications - Forms, Adding Controls to Forms, Handling Events, MsgBox, Input Box, Multiple Forms, Handling Mouse and Keyboard Events, Object Oriented Programming Creating and Using Classes and Objects, Handling Exceptions – On Error Goto.

UNIT – III

Developing ASP.NET Applications – ASP.NET Applications – Understanding ASP.NET Controls – Overview of ASP.NET Framework, Web Form Fundamentals – Web Control



Classes – Using Visual Studio.NET – Validation and Rich Controls – State Management – Tracing, Logging, and Error Handling.

UNIT – IV

Developing C#.NET Applications – Introducing C# – Overview of C# – Literals, Variables – Data Types, – Operators – Checked and Unchecked Operators – Expressions – Branching – Looping – Object Oriented Aspects Of C#: Class – Objects – Constructors and its Types – Inheritance, Properties, Indexers, Index Overloading – Polymorphism – Sealed Class and Methods – Interface – Abstract Class, Operator Overloading, – Delegates, Events, Errors and Exception – Threading.

UNIT – V

ADO.NET – Overview of ADO.NET – ADO.NET Data Access – Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class Data binding – Data List – Data Grid – Repeater – Files, Streams and Email – Using XML.

Text Books

1. James Holmes, “Struts: The Complete Reference”, McGraw Hill Professional, 2nd Edition, 2007
2. Mathew Mac Donald, “ASP.NET Complete Reference”, TMH, 2005.
3. Herbert Schildt, “The Complete Reference: C# 4.0”, Tata McGraw Hill, 2012.
Christian Nagel et al. “Professional C# 2012 with .NET 4.5”, Wiley India, 2012.
4. ASP.NET Unleashed, C# programming – Wrox publication, 2010.
5. Steven Holzner, “Visual Basic. NET Black Book”, Wiley Publisher, 1st Edition, 2000.

Reference Books

1. Jesse Liberty , ‘Programming C#, “ , O’Reilly Media, 4th Edition, 2010.
2. Mario Szpuszta, Matthew MacDonald , “Pro ASP.NET 4 in C# 2010: Includes Silverlight 2, “Apress, 3rd Edition, 2010.
3. J.Liberty, D.Hurwitz, “Programming ASP.NET”, O’REILLY, 3rd Edition, 2006.
4. Tim Anderson, “Visual Basic. Net Programming in Easy Steps”, Dreamtech Press.



Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Describes .NET Framework and Common Language Runtime.	K1 & K2
CO2	Understand the development and deployment of enterprise applications.	K2
CO3	Develop ASP.Net web services, secure web services and .Net remoting applications.	K2 & K3
CO4	Interpret concepts of constructors , inheritance and interface.	K4 & K5
CO5	Ability to handle data access technologies in ADO.NET for data manipulations.	K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	S	S
CO2	S	S	S	S	S
CO3	M	S	S	S	S
CO4	M	S	S	S	S
CO5	M	M	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)

Core Practical – VI		Course Code: 20UCA4P06		Course Title: .Net Programming Lab	
Semester	Hours/Week	Total Hours	Credits	Total Marks	
IV	3	45	2	100	

Course Objectives

1. Creates web based applications using . net frameworks.
2. Use different server controls to create rich user interactive websites.
3. Access data from the database in data bound controls on the web page.
4. Apply master page to different pages in the website.

List of Programs

1. Develop a Program for simple calculator.
2. Develop a Program using classes and objects.
3. Develop an application to create, save, update, delete and search employee profile in employee database system (with database connectivity).
4. Develop an application to create inventory management system (with database connectivity).
5. Develop an application to create student mark entry system (with database connectivity).
6. Design an ASP.Net Web Forms using the Applications.
7. Develop an ASP.Net Program to illustrate Validation Controls.
8. Develop an ASP.Net Program using Web User controls.
9. Develop an ASP.Net Program using Data Binding with Server controls.
10. Develop an ASP.Net Program using Database Programming concepts in ADO.Net.



Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Describes .NET Framework and Common Language Runtime.	K1 & K2
CO2	Understand the development and deployment of enterprise applications.	K2
CO3	Develop ASP.Net web services, secure web services and .Net remoting applications.	K2 & K3
CO4	Interpret concepts of constructors, inheritance and interface.	K4 & K5
CO5	Ability to handle data access technologies in ADO.NET for data manipulations.	K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	S	S
CO2	S	S	S	S	S
CO3	M	S	S	S	S
CO4	M	S	S	S	S
CO5	M	M	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – X		Course Code: 20UCA4P06		Course Title: Software Engineering
Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	5	75	4	100

Course Objectives

1. To enhance the basics software engineering methods and practices.
2. To learn the techniques for developing software systems.
3. To demonstrate the ability to work effectively as a team member/leader.

UNIT – I

Introduction to Software Engineering Some Definition – Some Size Factors – Quality and Productivity Factors – Managerial Issue. Planning a Software Project: Defining the Problem – Developing a Solution Strategy – Planning the Development Process – Planning an Organization Structure – Other Planning Activities.

UNIT – II

Software Cost Estimation: Software – Cost Factors – Software Cost Estimation Techniques – Specification Techniques – Level Estimation – Estimating Software Maintenance Costs.

UNIT – III

Software Requirements Definition: The Software Requirements Specification – Formal Languages and Processors for Requirements Specification.

UNIT – IV

Software Design: Fundamental Design Concepts – Modules and Modularizing Criteria – Design Notations – Design Techniques – Detailed Design Consideration – Real Time and Distributed System Design – Test Plan – Mile Stones Walk through and Inspection – Design Guidelines

**UNIT – V**

Verification and Validation Techniques: Quality Assurance – Static Analysis – Symbolic Exception – Unit Testing and Debugging – System Testing – Formal Verification. Software Maintenance: Enhancing Maintainability During Development – Managua Aspects of Software Maintenance – Configuration Management – Source Code Metrics – Other Maintenance Tools and Techniques.

Text Book

1. Richard E.Fairly - Software Engineering Concepts - Tata McGraw-Hill book Company, 2001.

Reference Books

1. R.S. Pressman, “Software Engineering”, McGraw Hill, 4th Edition, 1997
2. Rajib Mall, “Fundamentals of Software Engineering”, PHI, 2nd Edition, 2004,

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of Software Engineering.	K1
CO2	Understand the SPM concepts like cost estimation & scheduling.	K1 & K2
CO3	Analyse the software requirements for different projects.	K2 & K3
CO4	Apply the software engineering models in developing software applications.	K2, K3, K4 & K5
CO5	Understand the verification, validation and maintenance process.	K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create



Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	M	M	S
CO3	M	S	S	S	S
CO4	S	S	S	S	S
CO5	M	M	M	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – XI		Course Code: 20UCA5C11		Course Title: Java Programming
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	5	75	4	100

Course Objectives

1. To understand the nature of Java programming.
2. To describe the core syntax and semantics of Java programming language.
3. To understand Object oriented concepts like data abstraction, encapsulation, etc.
4. To solve the real world scenarios using top down approach.
5. To understand various Java programming constructs.

UNIT – I

Java Overview: Introduction – Simple Java Program – Java Program Structure – Java Tokens – Java Statements – JVM – Command Line Arguments – Constants, Variables, and Data Types – Operators and Expressions.

UNIT – II

Decision Making and Branching: Introduction – Decision Making with if Statement – Simple if Statement – The if...else Statement – Nesting of if...else Statement – The else if Ladder – The Switch Statement – The ?: Operator. Decision Making and Looping: Introduction – The While Statement – The Do Statement – The For Statement – Jumps in Loops – Labelled Loops. Classes, Objects and Methods: Introduction – Defining a Class – Fields Declaration – Methods Declaration – Creating Objects – Accessing Class Members – Constructors – Methods Overloading – Static Members – Nesting of Methods – Inheritance – Overriding Methods – Final Variables and Methods – Final Classes – Finalizer Methods – Abstract Methods and Classes – Methods with Var args – Visibility Control.



UNIT – III

Arrays, Strings and Vectors: Introduction – One-Dimensional Arrays – Creating an Array – Two Dimensional Arrays – Strings – Vectors – Wrapper Classes – Enumerated Types – Annotations.

Interfaces: Introduction – Defining Interfaces – Extending Interfaces – Implementing Interfaces – Accessing Interface Variables – Packages: Introduction – Java API Packages – Using System Packages – Naming Conventions – Creating Packages – Accessing a Package – Using a Package – Adding a Class to a Package – Hiding Classes – Static Import.

UNIT – IV

Multithreaded Programming: Introduction – Creating Threads – Extending the Thread class – Stopping and Blocking a Thread - Life cycle of a Thread – Using Thread Methods – Thread Exceptions – Thread Priority – Implementing the Runnable Interface. Managing Errors and Exceptions: Introduction – Types of Errors – Exceptions – Syntax of Exception Handling Code – Multiple Catch Statements – Using Finally Statement – Throwing Our Own Exceptions. Applet Programming: Introduction – Difference Between Applets and Applications – Write Applets – Building Applet Code – Applet Life Cycle – Creating an Executable Applet – Designing a Web Page – Applet Tag – Adding Applet to HTML File – Running the applet – Applet Tags – Passing Parameters to Applets – Aligning the Display – Displaying Numerical Values – Getting Input from the User – Event Handling.

UNIT – V

Graphics Programming: Introduction – The Graphics Class - Lines and Rectangles – Circles and Ellipses – Drawing Arcs – Drawing polygons – Line Graphs – Using Control Loops in Applets – Drawing Bar Charts. Managing I/O Files in Java: Introduction – Concept of Stream – Stream Classes – Byte Stream Classes – Character Stream Classes.

Text Book

1. E. Balagurusamy, "Programming with Java," Tata McGraw Hill Pub. Ltd., New Delhi, 4th Edition, 2009.

Reference Books

1. Herbert Schild, "Java: The Complete Reference," Ninth Edition, Oracle Press, 2014



2. Rohit Khurana, "Programming with JAVA", VIKAS Publisher., 2014

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the need of object oriented programming, fundamental concepts.	K1 & K2
CO2	Implement relationships between classes.	K2 & K3
CO3	Apply concepts for various programming applications.	K3, K4 & K5
CO4	Implement applets for GUI concepts.	K4, K5 & K6
CO5	Developed skills in graphics programming.	K4, K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	M	M	S	M	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core Practical – VII		Course Code: 20UCA5P07		Course Title: Java Programming Lab
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	3	45	2	100

Course Objectives

1. To understand the nature of Java programming.
2. To describe the core syntax and semantics of Java programming language.
3. To understand Object oriented concepts like data abstraction, encapsulation, etc.
4. To solve the real world scenarios using top down approach.
5. To understand various Java programming constructs.

Practical Lists

1. Write a program to find the Area of Square, Rectangle and Circle using Method Overloading.
2. Write a program to sort the list of numbers using Command Line Arguments.
3. Write a program to multiply the given two matrices.
4. Write a program to design a class to represent a bank account. Include the following:
Data Members: Name of the depositor, Account number, Type of account, and Balance amount in the account.
Methods: To assign initial values, To deposit an amount, To withdraw an amount after checking balance, and To display the name and balance.
5. Write a program that import the user defined package and access the Member variable of classes that contained by Package.
6. Write a program to handle the Exception using try and multiple catch blocks.
7. Write a program to illustrate the use of multi threads.
8. Write a program to create student registration form using applet with Name, Address, Sex, Class, Email-id.
9. Write a program to draw the line, rectangle, oval, text using the graphics method.



10. Write a program to create a sequential file that could store details about five products. Details include product code, cost, and number of items available and are provided through the keyboard. Compute and print the total value of all the five products.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the need of object oriented programming, fundamental concepts.	K1 & K2
CO2	Implement relationships between classes.	K2 & K3
CO3	Apply concepts for various programming applications.	K3, K4 & K5
CO4	Implement applets for GUI concepts.	K4, K5 & K6
CO5	Developed skills in graphics programming.	K4, K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	M	M	S	M	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – XII		Course Code: 20UCA5C12		Course Title: LINUX & Shell Programming
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	5	75	4	100

Course Objectives

1. To understand about Linux and Unix OS.
2. To learn about comparison and working of shell.
3. To impart knowledge about the text filtering tools, arrays and logical operators
4. To implement the functions, decision making and repetitive tasks
5. To know about the file handling and sort commands

UNIT – I

Introduction to Linux: Operating System and Linux – History of Linux and UNIX – Linux Overview – Linux Distributions – VI Editors.

UNIT – II

Shell – Comparison of Shells – Working in the Shell – Learning Basic Commands – Compiler and Interpreter Differences – Various Directories – Drilling Deep into Process Management, Job Control and Automation.

UNIT – III

Text Processing – Text Filtering Tools – Working with Commands – Logical Operators – Local Variables and its Scope – Working with Arrays.

UNIT – IV

Tricks with Shell Scripting – Interactive Shell Scripts – The Here Document and << Operator – Sort Command – WC Command – File Handling – Debugging.

**UNIT – V**

Automating Decision – Making in Scripts – Automating Repetitive Tasks – Working with Functions.

Text Books

1. Richard L. Petersen, “The Complete Reference LINUX”, McGraw Hill, 6th Edition 2008.
2. Ganesh Naik, “LINUX Shell Scripting”, Packt Publishing Ltd, 2nd Edition, 2018.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understanding the concepts of control structures in programming.	K1
CO2	Implementing the concepts of file operation in programming.	K1, K2 & K3
CO3	Acquired concepts of Linux operating system, its kernel and different subsystems of kernel, types of shells.	K3 & K4
CO4	Execute various types of commands and standard shell.	K4 & K5
CO5	Implement shell scripts using this editor involving decision control, looping and control flow statements.	K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	S	M	S
CO3	S	S	S	S	S
CO4	M	S	S	M	S
CO5	M	S	S	S	M

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)

Core Practical – VIII		Course Code: 20UCA5P08		Course Title: LINUX & Shell Programming Lab	
Semester	Hours/Week	Total Hours	Credits	Total Marks	
V	3	45	2	100	

Course Objectives

1. To understand about Linux and Unix OS.
2. To learn about comparison and working of shell.
3. To impart knowledge about the text filtering tools, arrays and logical operators.
4. To implement the functions, decision making and repetitive tasks.
5. To know about the file handling and sort commands.

List of Programs

1. Write a shell script to stimulate the file commands: rm, cp, cat, mv, cmp, wc, split, diff.
2. Write a shell script to show the following system configuration:
 - a. Currently logged user and his log name.
 - b. Current shell, home directory, Operating System type, current Path setting, current working directory.
 - c. show currently logged number of users, show all available shells.
 - d. show CPU information like processor type, speed.
 - e. Show memory information.
3. Write a Shell Script to implement the following: pipes, Redirection and tee commands.
4. Write a shell script for displaying current date, user name, file listing and directories by getting user choice.
5. Write a shell script to implement the filter commands.
6. Write a shell script to remove the files which has file size as zero bytes.
7. Write a shell script to find the sum of the individual digits of a given number.
8. Write a shell script to find the greatest among the given set of numbers using command line arguments.



9. Write a shell script for palindrome checking.
10. Write a shell script to print the multiplication table of the given argument using for-loop.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understanding the concepts of control structures in programming.	K1
CO2	Implementing the concepts of file operation in programming.	K1, K2 & K3
CO3	Acquired concepts of Linux operating system, its kernel and different subsystems of kernel, types of shells.	K3 & K4
CO4	Execute various types of commands and standard shell.	K4 & K5
CO5	Implement shell scripts using this editor involving decision control, looping and control flow statements.	K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	S	M	S
CO3	S	S	S	S	S
CO4	M	S	S	M	S
CO5	M	S	S	S	M

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – XIII		Course Code: 20UCA5C13		Course Title: Computer Networks
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	6	90	4	100

Course Objectives

1. To deal with basic ideas of networking domain.
2. To understand the principles and concepts on computer networks.
3. To describe the various communication networks and their main components.
4. To identify some of the factors driving the need for network security.

UNIT – I

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, 3G Mobile Phone Networks, Wireless LANs – RFID and Sensor Networks – Physical Layer – Theoretical Basis for Data Communication – Guided Transmission Media.

UNIT – II

Wireless Transmission – Communication Satellites – Digital Modulation and Multiplexing – Telephones Network Structure – Local Loop, Trunks and Multiplexing, Switching. Data Link Layer: Design Issues – Error Detection and Correction.

UNIT – III

Elementary Data Link Protocols – Sliding Window Protocols – Example Data Link Protocols – Packet Over SONET, ADSL – Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols.

**UNIT – IV**

Network Layer – Design Issues – Routing Algorithms – Congestion Control Algorithms – Quality of Service – Network Layer of Internet – IP Protocol – IP Address – Internet Control Protocol.

UNIT – V

Transport Layer – Transport Service – Elements of Transport Protocol – Addressing, Establishing & Releasing a Connection – Error Control, Flow Control, Multiplexing and Crash Recovery – Internet Transport Protocol – TCP – Network Security: Cryptography.

Textbook

1. A. S. Tanenbaum, “Computer Networks”, Pearson Education, 5th Edition, 2011

Reference Books

1. B. Forouzan, “Introduction to Data Communications in Networking”, Tata McGraw Hill, New Delhi, 1998,
2. F. Halsall, “Data Communications, Computer Networks and Open Systems”, Addison Wesley, 1995.
3. D. Bertsekas and R. Gallager, “Data Networks”, Prentice Hall of India, New Delhi, 1992.
4. Lamarca, “Communication Networks”, Tata McGraw Hill, New Delhi, 2002.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Visualize the different aspects of networks, protocols and network design models.	K1 & K2
CO2	Examine various layer design issues protocols.	K1 & K2
CO3	Analyze and compare different LAN protocols.	K2 & K3
CO4	Compare and select appropriate routing algorithms for a network.	K4 & K5
CO5	Compare and select appropriate routing algorithms for a network applets.	K4 & K5



K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	S	S	S	S	S
CO3	M	M	S	S	S
CO4	M	S	S	M	S
CO5	M	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – XIV		Course Code: 20UCA6C14		Course Title: PHP withMySQL
Semester	Hours/Week	Total Hours	Credits	Total Marks
VI	5	75	4	100

Course Objectives

1. To understand basics of PHP.
2. To elaborate the core syntax of PHP Language.
3. To make the students to get practical knowledge of PHP with MYSQL lab.

UNIT – I

Introducing PHP – Basic Development Concepts – Creating First PHP Scripts – Using Variable and Operators – Storing Data in Variable – Understanding Data Types – Setting and Checking Variables Data Types – Using Constants – Manipulating Variables with Operators.

UNIT – II

Controlling Program Flow: Writing Simple Conditional Statements – Writing More Complex Conditional Statements – Repeating Action with Loops – Working with String and Numeric Functions.

UNIT – III

Working with Arrays: Storing Data in Arrays – Processing Arrays with Loops and Iterations – Using Arrays with Forms - Working with Array Functions – Working with Dates and Times.

UNIT – IV

Using Functions and Classes: Creating User-Defined Functions – Creating Classes – Using Advanced OOP Concepts. Working with Files and Directories: Reading Files-Writing Files – Processing Directories.

UNIT – V



Working with Database and SQL: Introducing Database and SQL – Using MySQL – Adding and modifying Data – Handling Errors – Using SQLite Extension and PDO Extension. Introduction XML – Simple XML and DOM Extension.

Text Book

1. Vikram VASWANI, “PHP A Beginner's Guide”, Tata McGraw-Hill, 2008.

Reference Books

1. Steven Holzner. “The PHP Complete Reference”, Tata McGraw-Hill, 2007.
2. Steven Holzer, “Spring into PHP5”, Tata McGraw Hill Edition, 2011.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Create small programs using basic PHP concepts.	K1 & K2
CO2	Apply In-Built and Create User defined functions in PHP programming.	K2 & K3
CO3	Design and develop a Web site using form controls for presenting web based content.	K3 & K4
CO4	Debug the Programs by applying concepts and error handling techniques of PHP.	K3, K4 & K5
CO5	Create dynamic Website/ Web based Applications, using PHP, MySQL database.	K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create



Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	M	S	S	S
CO3	S	M	S	S	S
CO4	M	M	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core Practical – IX		Course Code: 20UCA6P09		Course Title: PHP with MySQL Lab
Semester	Hours/Week	Total Hours	Credits	Total Marks
VI	3	45	2	100

Course Objectives

1. To learn PHP fundamentals.
2. To train the students for the basics of coding and executing PHP language.
3. To understand web development programme.
4. To learn apply network function and cookies with sessions.

List of Programs

1. Create a simple HTML form and accept the user name and display the name through PHP echo statement.
2. Write a PHP script to redirect a user to a different page.
3. Write a PHP function to test whether a number is greater than 30, 20 or 10 using ternary operator.
4. Create a PHP script which display the capital and country name from the given array. Sort the list by the name of the country.
5. Write a PHP script to calculate and display average temperature, five lowest and highest temperatures.
6. Create a script using a for loop to add all the integers between 0 and 30 and display the total.
7. Write a PHP script using nested for loop that creates a chess board.
8. Write a PHP function that checks if a string is all lower case.
9. Write a PHP script to calculate the difference between two dates.
10. Write a PHP script to display time in a specified time zone.

Course Outcomes (COs)



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

CO Number	CO Statement	Knowledge Level
CO1	Understand and describe PHP with MYSQL program.	K1 & K2
CO2	Acquire the knowledge of PHP Syntax with/ without HTML.	K2 & K3
CO3	Gain the knowledge to set cookies and sessions.	K2, K3
CO4	Connect various databases especially with MYSQL.	K3, K4 & K5
CO5	Develop their own web application.	K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	S	S	S
CO3	M	M	S	S	S
CO4	M	M	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – XV		Course Code: 20UCA6C15		Course Title: Mobile Computing
Semester	Hours/Week	Total Hours	Credits	Total Marks
VI	5	75	4	100

Course Objectives

1. To learn the basic concepts of mobile computing and its applications.
2. To provide various emerging technologies in Mobile computing services.
3. To gain knowledge about telecommunication systems.
4. To understand various mobile network layers.

UNIT – I

Introduction – Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing – Wireless Transmissions – Multiplexing – Spread Spectrum and Cellular Systems – Medium Access Control – Comparisons.

UNIT – II

Telecommunication Systems – GSM – Architecture – Sessions – Protocols – Hand Over and Security – UMTS and IMT – 2000 – Satellite Systems.

UNIT – III

Wireless Lan – IEEE S02.11 – Hiper LAN – Bluetooth – Security and Link Management.

UNIT – IV

Mobile Network Layer – Mobile IP – Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies

UNIT – V



Mobile Transport Layer – Congestion Control – Implication of TCP Improvement – Mobility – Indirect – Snooping – Mobile – Transaction Oriented TCP – TCP Over Wireless – Performance.

Text Book

1. J. Schiller, “Mobile Communications”, Pearson Education, Delhi, 2nd Edition, 2003.

Reference Books

1. Hansmann, Merk, Nicklous, Stober, “Principles of Mobile Computing”, Springer (India), 2nd Edition, 2004.
2. Pahlavan, Krishnamurthy, “Principle of wireless Networks: A unified Approach”, Pearson Education, Delhi, 2003.
3. Martyn Mallick, “Mobile and Wireless Design Essentials”, Wiley Dreamtech India Pvt. Ltd., New Delhi, 2004.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals of mobile computing.	K1 & K2
CO2	Analyze the unique characteristics in mobile communication.	K2, K3 & K4
CO3	Compare and contrast multiple division techniques, mobile communication systems and existing wireless networks.	K3 & K4
CO4	Demonstrate the basic skills for cellular network design.	K4 & K5
CO5	Apply knowledge of TCP/IP extensions for mobile and wireless networking.	K4, K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs



PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	M	M	S	S	S
CO3	M	M	S	S	S
CO4	S	M	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Core – XVI		Course Code: 20UCA6C16		Course Title: Computer Graphics
Semester	Hours/Week	Total Hours	Credits	Total Marks
VI	5	75	4	100

Course Objectives

1. To interpret the mathematical foundation of the concepts of computer graphics.
2. To describe the fundamentals of animation.
3. To understand a typical graphics pipeline.
4. To apply graphics programming techniques to design and create computer graphics.

UNIT – I

Introduction to Graphic Devices – Picture Representation, Display Devices, Display Adapters, Types of Printers, Plotters & Input Devices

UNIT – II

Transformations – Basic 2D & 3D Transformations – Translation, Scaling, Rotation, Reflection, Shearing, Multiple Transformations, Rotation About an Axis Parallel to a Coordinate Axis, Rotation About an Arbitrary Axis in Space, Affine and Perspective Geometry, Orthographic Projections and Axonometric Projections

UNIT – III

Raster Scan Graphics – Bresenham's Line and Circle Drawing Algorithms, Scan Conversion, RLE, Frame Buffer, Scan Converting Polygons – Edge Fill and Seed Fill Algorithms, Anti-Aliasing and Half Toning

UNIT – IV

Clipping and Display File Compilation – Sutherland – Cohen Line Clipping Algorithm, Windowing and Viewporting – Segmented Display File, Structure and Compilation – Hidden Surface and Hidden Line Removal – Backface Removal Algorithm, Z- Buffer, Warnock Algorithm, Hidden Line Elimination.

**UNIT – V**

Plane Curves and Space Curves – Curve Representation, Nonparametric and Parametric Curves, Representation of Space Curves, Cubic Spline, Parabolic Blended Curves, Bezier Curves and B-Spline Curves.

Text Books

1. D.F. Rogers, J.A. Adams, “Mathematical elements for Computer Graphics”, Tata McGraw-Hill, New Delhi, 2nd Edition, 2002.
2. D.F. Rogers, “Procedural elements for Computer Graphics”, Tata McGraw-Hill, New Delhi, 2nd Edition, 2001.

Reference Books

1. W.M. Neumann and R.F. Sproull, “Principles of Interactive Computer Graphics”, Tata McGraw-Hill, New Delhi
2. D. Hearn and M. P. Baker, “Computer Graphics (C Version)”, Pearson Education, 2nd Edition, 2004.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Formulate the design process and principles.	K1 & K2
CO2	Assimilate the graphics and their transformations.	K1, K2 & K3
CO3	Generate primitives and interactive graphics.	K2, K3 & K4
CO4	Work with the concepts of graphics packages and geometric models.	K4 & K5
CO5	Create applications and design the three dimensional graphics.	K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create



Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	M	M	S	S	S
CO3	S	M	S	S	S
CO4	S	S	S	S	S
CO5	M	M	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Elective – I		Course Code: 20UCA5E01		Course Title: Cyber Security
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	6	90	4	100

Course Objectives

1. To know about cost of security and Ransom ware.
2. To understand the configuration and security challengers.
3. To educate the dark side of computer's.
4. To protect from outside attacks and how to use the networks safely.

UNIT – I

Cyber Security: Steps for a Secure Cloud, Azure Security Center Cost Model: Shared Cost Model – License Cost of Security Center – Azure Cost of Data Storage – Other Considerations – Enterprise Security Architecture – Ransomware Lessons Learned.

UNIT – II

Cloud Security Operations: Cloud Security Challenges – Security Center Overview – Security Center Placement – Select an Azure Subscription. Azure Security Center Configuration: Azure Infrastructure Design – Standard Tier Advantages – Using Security Center.

UNIT – III

Dark Side of the Computer: Viruses, Trojans, and Attacks – Vulnerabilities, Risk Assessment, and Risk Management – Emerging Field of Cyber Security.

UNIT – IV

Internet, Social Media, and Cyber Attacks on Critical Infrastructures – Cyber Threat Spectrum – Cyberspace Attacks and Weapons.

**UNIT – V**

Basics of Critical Infrastructure Protection – Random Nature of Faults, Failures, and Engineering – In the Presence of Attackers – Issues of Time and Sequence – Economic Impact on Regulation and Duties to Protect – Critical Infrastructure Protection Strategies and Operations – Protection Design Goals and Duties to Protect.

Text Books

1. Marshall Copeland, “Cyber Security on Azure_ An IT Professional’s Guide to Microsoft Azure Security Center”, Apress, 1st Edition, 2017.
2. Taylor & Francis Group edited “Cyber-security Protecting Critical Infrastructures from Cyber Attack and Cyber Warfare”, CRC Press, 2015.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Know about the security issues in the real world.	K1
CO2	Prevent from attacks and cost management.	K1 & K2
CO3	Identify the threads and risk management.	K2 & K3
CO4	Know of internet, social media and cyber-attacks and how they reach us.	K4 & K5
CO5	Apply appropriate strategies to protect from attacks.	K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create



Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	M	M	S	S	S
CO3	M	M	S	S	S
CO4	S	M	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Elective – I		Course Code: 20UCA5E02		Course Title: Artificial Intelligence
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	6	90	4	100

Course Objectives

1. To provide a strong foundation of fundamental concepts in Artificial Intelligence.
2. To provide a basic exposition to the goals and methods of Artificial Intelligence.
3. To develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents.
4. To enable the student to apply these techniques in applications which involve perception, reasoning and learning.

UNIT – I

Overview of Artificial Intelligence – Introduction – History of AI – Application of AI – Objectives of AI – Future of AI - Symbolic Logic: Normal Forms in Propositional Logic – Logical Consequences – Resolution Principal – Predicate Calculus – Well Formed Formulas – Clausal Form – Rules of Inference – Unification – Resolution – Rule-Based Expert Systems.

UNIT – II

Knowledge Acquisition and Representation: Knowledge Engineering – Producer for Knowledge Acquisition – Knowledge Representation – Network Representation Schemes Reasoning and (KRR) Systems – Reasoning – Knowledge Representation and Reasoning (KRR) System – Knowledge Representation Languages – Domain Modeling – Semantic Nets (Association Network) Reasoning System.

UNIT – III

Uncertainty: Introduction – Non-Monotonic and Monotonic Reasoning – Confidence Factor – Bayes Theorem – Dempster and Shafer's Theory of Evidence – Non Classical Logics Search



Techniques – Problem Representation – Problem Solving In AI – Blind Search Techniques – Heuristic Search Techniques – Game Searches.

UNIT – IV

AI Technologies – Computer Vision – Natural Languages Processing – Speech Recognition Expert Systems: Introduction – Basic Character of an Expert System – Knowledge Engineering – Inferencing – Expert System Tools – Applications.

UNIT – V

Natural Network: Introduction – Difference Between Human and Machine Intelligence – Features of Biological Neural Network – Human Neurons to Artificial Neurons – Learning Algorithms – Difference Network Architectures and Their Applications – Comparisons of Neutral Networks and Rule Based Methods – Comparisons of Neutral Networks and Expert System – Benefits of Neural Computing – Limitations of Neural Computing.

Text Book

1. Rajendra Akerkar, “Introduction to Artificial Intelligence”, PHI, 2nd Edition, 2014.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.	K1 & K2
CO2	Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.	K2 & K3
CO3	Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.	K2, K3 & K4
CO4	Demonstrate proficiency in applying scientific method to models	K4 & K5



	of machine learning.	
CO5	Design a knowledge based system.	K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	M	S	S
CO3	M	S	S	S	S
CO4	M	M	S	S	S
CO5	S	M	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Elective – I		Course Code: 20UCA5E03		Course Title: E-Commerce Technologies
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	6	90	4	100

Course Objectives

1. To provide an introduction to information systems for business and management.
2. Designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems.

UNIT – I

History of E-Commerce and Indian Business Context: E-Commerce – Emergence of the Internet – Emergence of the WWW – Advantages of E-Commerce – Transition to E-Commerce in India – The Internet and India – E-transition Challenges for Indian Corporate. Business Models for E-commerce: Business Model – E-business Models Based on the Relationship of Transaction Parties – E-business Models Based on the Relationship of Transaction Types.

UNIT – II

Enabling Technologies of the World Wide Web: World Wide Web – Internet Client -Server Applications – Networks and Internets – Software Agents – Internet Standards and Specifications – ISP. E-Marketing: Traditional Marketing – Identifying Web Presence Goals – Online Marketing – E-advertising – Ebranding.

UNIT – III

E-Security: Information system Security – Security on the Internet – E-business Risk Management Issues – Information Security Environment in India. Legal and Ethical Issues: Cyberstalking – Privacy is at Risk in the Internet Age – Phishing – Application Fraud – Skimming – Copyright – Internet Gambling – Threats to Children.

**UNIT – IV**

e-Payment Systems: Main Concerns in Internet Banking – Digital Payment Requirements – Digital Token-based e-payment Systems – Classification of New Payment Systems – Properties of Electronic Cash – Risk and e-Payment Systems – Designing E-Payment Systems – Digital Signature – Online Financial Services in India – Online Stock Trading.

UNIT – V

Information Systems for Mobile Commerce: What is Mobile Commerce? – Wireless Applications – Cellular Network – Wireless Spectrum – Technologies for Mobile Commerce – Wireless Technologies – Different Generations in Wireless Communication – Security Issues Pertaining to Cellular Technology. Portals for E-Business: Portals – Human Resource Management – Various HRIS Modules.

Text Book

1. P.T. Joseph, “E-Commerce - An Indian Perspective”, PHI, 4th Edition, 2012.

Reference Book

1. David Whiteley, “E-Commerce Strategy, Technologies and Applications”, Tata Mc-Graw-Hill, 2001.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts and technologies used in the field of management information systems.	K1 & K2
CO2	Design components, systems and/or processes to meet required specifications for a web presence.	K2 & K3
CO3	Communicate effectively in ways appropriate to the discipline, audience and purpose.	K3
CO4	Have the knowledge of the different types of management information systems.	K4 & K5



CO5	Understand the processes of developing and implementing information systems.	K5 & K6
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K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	M	M	S	S	S
CO3	S	M	S	S	S
CO4	S	S	S	S	S
CO5	S	M	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Elective – II		Course Code: 20UCA6E04		Course Title: Data Mining
Semester	Hours/Week	Total Hours	Credits	Total Marks
VI	5	75	4	100

Course Objectives

1. To learn the basic concepts of Data Mining algorithms, methods and tools.
2. To Identify appropriate data mining algorithms to solve real world problems.
3. To develop and apply critical thinking, problem-solving, and decision-making skills.
4. To discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
5. To characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.

UNIT – I

Introduction: Data Mining Tasks – Data Mining Versus Knowledge Discovery in Databases – Relational Databases – Data Warehouses – Transactional Databases – Object Oriented Databases – Spatial Databases – Temporal Databases – Text and Multimedia Databases – Heterogeneous Databases – Mining Issues – Metrics – Social Implications of Data Mining.

UNIT – II

Data Preprocessing: Why Preprocess the Data – Data Cleaning – Data Integration – Data Transformation – Data Reduction – Data Discretization.

UNIT – III

Data Mining Techniques: Association Rule Mining – The Apriori Algorithm – Multilevel Association Rules – Multidimensional Association Rules – Constraint Based Association Mining.

UNIT – IV



Classification and Prediction: Issues regarding Classification and Prediction – Decision Tree induction – Bayesian Classification – Back Propagation – Classification Methods – Prediction – Classifiers accuracy.

UNIT – V

Clustering Techniques: Cluster Analysis – Clustering Methods – Hierarchical Methods – Density Based Methods – Outlier Analysis – Introduction to Advanced Topics: Web Mining, Spatial Mining and Temporal Mining.

Text Book

1. J. Han and M. Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufmann, New Delhi, 2001,

Reference Books

1. M.H. Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education, Delhi, 2003,
2. Paulraj Ponnaiah, “Data Warehousing Fundamentals”, Wiley Publishers, 2001.
3. S.N. Sivananda and S. Sumathi, “Data Mining”, Thomsan Learning, Chennai, 2006.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the data mining principles and techniques.	K1 & K2
CO2	Learn the concept of raw data processing using data mining algorithms.	K1, K2 & K3
CO3	Learn data mining algorithms to build analytical applications.	K2, K3 & K4
CO4	Gain information's to extract patterns and to solve problems.	K3, K4 & K5
CO5	To cluster the high dimensional data for better organization.	K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs



PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	M	M	S	S	S
CO3	S	M	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Elective – II		Course Code: 20UCA6E05		Course Title: System Administration & Maintenance
Semester	Hours/Week	Total Hours	Credits	Total Marks
VI	5	75	4	100

Course Objectives

1. Understand basic concept & structure of Computer Hardware & Networking Components.
2. Identify the existing configuration of the computers & peripherals.
3. Apply their knowledge about computer peripherals to identify/rectify problems on board.
4. Integrate the PC's into Local Area Network & re-install OS.

UNIT – I

Introduction to Personal Computer: Computer System – Purposes & Characteristics of Cases – Power Supplies – Internal Components – Ports – Cables – Input devices – Output devices. Safe Lab Procedures and Tool Use: Safe Working Conditions and Procedures – Tools and Software used with PC Components.

UNIT – II

Computer Assembly: Open Case – Install Power Supply – Attach Components to Motherboard – Installation: Motherboard – Internal Drives – Drives in External Bays - Adapter Cards. Internal Cables Connections – Reattach Side Panels – Connection of External Cables – Boot the Computer. Preventive Maintenance and Troubleshooting: Purpose of Preventing Maintenance – Steps of Troubleshooting Process.

UNIT – III

Fundamental Operating System: Purposes – Characteristics of Modern Operating Systems – Concepts Comparisons, Limitations, and Compatibilities - Determination of Operating System Based on Customer Needs – Installation of Operating System – Navigate a GUI (Windows) – Common Preventive Maintenance Techniques – Troubleshoot.

**UNIT – IV**

Fundamental Laptops and Portable Devices: Common Uses – Components of Laptop – Comparison of the Components of Desktop and Laptops – Configure Laptops – Mobile Phone Standards – Preventive Maintenance Techniques – Troubleshoot Laptop and Portable Devices. Fundamental Printers and Scanners: Types of Printers and Scanners – Installation and Configuration Process of Printers and Scanners – Preventive Maintenance Techniques – Troubleshoot.

UNIT – V

Fundamental Networks: Principles – Types – Concepts and Technologies – Physical Components – LAN Topologies and Architectures – Standard Organizations – Ethernet Standards – OSI and TCP/IP Models – Configuration of NIC and Modem – Establishing Connectivity – Preventive Maintenance Techniques – Troubleshoot. Fundamental Security: Security Threats – Security Procedures – Preventive Maintenance Techniques – Troubleshoot Security.

Text book

1. David Anfinson & Ken Quamme, “IT Essentials: PC Hardware and Software Companion Guide”, Pearson Publications, 3rd Edition, 2008.

Reference Book

1. Quentin Docter, Emmett Dulaney and Toby Skandier, “CompTIA A+ Complete Review Guide: Exam 220-901, Exam 220 – 902”, Wiley Publications, 3rd Edition, 2015.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Visualize the different aspects of networks, protocols and network design models.	K1
CO2	Examine various layer design issues protocols.	K1 & K2



CO3	Analyse and compare different LAN protocols.	K3 & K4
CO4	Compare and select appropriate routing algorithms for a network.	K4 & K5
CO5	Compare and select appropriate routing algorithms for a network applets.	K4 & K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	M	S	S	S
CO3	M	M	S	S	S
CO4	M	M	S	S	S
CO5	M	M	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Elective – II		Course Code: 20UCA6E05		Course Title: Software Testing
Semester	Hours/Week	Total Hours	Credits	Total Marks
VI	5	75	4	100

Course Objectives

1. Understand testing process and types of bugs occurred.
2. Recognize flow and graphing methods.
3. Accomplished to domain and knowledge of interfaces.
4. Familiar with metrics and syntax of testing paths.
5. Know all the testing types and launches everything without bugs.

UNIT – I

Introduction: Purpose – Productivity and Quality in Software – Testing vs Debugging – Model for Testing – Bugs – Types of Bugs – Testing and Design Style.

UNIT – II

Flow / Graphs and Path Testing – Achievable Paths – Path Instrumentation – Application – Transaction Flow Testing Techniques.

UNIT – III

Data Flow Testing Strategies – Domain Testing: Domains and Paths – Domains and Interface Testing.

UNIT – IV

Linguistic – Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing – Formats – Test Cases.

**UNIT – V**

Logic Based Testing – Decision Tables – Transition Testing – States, State Graph, State Testing.

Text Books

1. B. Beizer, “Software Testing Techniques”, DreamTech India, New Delhi, 2nd Edition, 2003.
2. K.V.K. Prasad, “Software Testing Tools”, DreamTech. India, New Delhi, 2005.

Reference Books

1. Burnstein, “Practical Software Testing”, Springer International Edn, 2003.
2. E. Kit, “Software Testing in the Real World: Improving the Process”, Pearson Education, Delhi, 1995.
3. R. Rajani, and P.P. Oak, “Software Testing”, Tata Mcgraw Hill, New Delhi, 2004.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Be acquainted with testing and design style.	K1 & K2
CO2	Rich knowledge on graphs, flow of testing and choosing best techniques for testing.	K1 & K2
CO3	Intelligence acquaintance domains and interfacing testing of any software.	K3
CO4	Thorough in depth on any test cases they achieved by themselves.	K3, K4 & K5
CO5	Deal the bug and matching correct testing strategies for everything.	K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create



Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	S	M	S	S	S
CO3	S	S	S	S	S
CO4	M	M	S	S	S
CO5	S	M	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Skill Based Elective Course – I		Course Code: 20UCA2SP01		Course Title: Office Automation Lab
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	2	30	2	100

Course Objectives

1. Understand the components of office automation.
2. Perform operations using MS Word, Excel, Power Point.
3. Understand and discuss about the use of Office Package.

I. MS-WORD

1. Text Manipulation: Write a paragraph about your institution and Change the font size and type, Spell check, Aligning and justification of Text.
2. Bio data: Prepare a Bio-data.
3. Find and Replace: Write a paragraph about yourself and do the following.
Find and Replace - Use Numbering Bullets, Footer and Headers.
4. Tables and manipulation: Creation, Insertion, Deletion (Columns and Rows).
Create a mark sheet.
5. Mail Merge: Prepare an invitation to invite your friends to your birthday party. Prepare at least five letters.

II. MS-EXCEL

1. Data sorting-Ascending and Descending (both numbers and alphabets).
2. Mark list preparation for a student.
3. Individual Pay Bill preparation.
4. Invoice Report preparation.
5. Drawing Graphs. Take your own table.

III. MS-POWERPOINT

1. Create a slide show presentation for a seminar.



2. Preparation of Organization Charts.
3. Create a slide show presentation to display percentage of marks in each semester for all students.
 - a. Use bar chart (X-axis: Semester, Y-axis: % marks).
 - b. Use different presentation template different transition effect for each slide.

E-References

1. <https://ptgmedia.pearsoncmg.com/images/9780735623026/samplepages/9780735623026.pdf>
2. https://www.dit.ie/media/ittraining/msoffice/MOAC_Excel_2016_Core.pdf
3. <https://ptgmedia.pearsoncmg.com/images/9780735697799/samplepages/9780735697799.pdf>

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Recognize when to use each of the Microsoft Office programs to create professional and academic documents.	K1
CO2	Create personal, academic and business documents following current professional and/or industry standards.	K1, K2 & K3
CO3	Identify and apply the menus in MS-Word.	K3, K4 & K5
CO4	Understand the menus in Excel.	K3, K4 & K5
CO5	Understand the components of Power point.	K3, K4 & K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create



Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	M	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Skill Based Elective Course – II		Course Code: 20UCA4S02		Course Title: Quantitative Aptitude – I
Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	2	30	2	100

Course Objectives

1. To enhance the interpersonal skills and problem solving skills.
2. To improve the basic mathematical skills.
3. To help students who are preparing for any type of competitive examinations.

UNIT – I

Communication: Tense – Sentence Pattern - Articles – Prepositions.

UNIT – II

Soft Skill: Self Introduction – Interpersonal Skills – Soft Skills Training – Group Discussion – Importance of GD – Types of GD – Movements and Gestures to be Avoided in a GD.

UNIT – III

Numerical Aptitude: Problems on Numbers – Problems on Ages – Percentage.

UNIT – IV

Numerical Aptitude: Profit and Loss – Ratio & Proportion – Time & Work.

UNIT – V

Verbal Reasoning: Letter Series – Number Series – Coding and Decoding.

Text Books

1. Hari Mohan Prasad & Uma Rani Sinha, “Objective English for Competitive Examinations”, Tata McGraw Hill Education Private Ltd., (Unit – I)



2. M. S. Rao, “Soft Skills Enhancing Employability-Connecting Campus with Corporate”, IK International Publishing House, NewDelhi, 2010. (Unit – II)
3. Alex.K, “Soft Skills-Know Yourself and Know the World”, S.Chand Company Ltd., 2011. (Unit – II)
4. R.S. Aggarwal, “Quantitative Aptitude”, S.Chand, 2010. (Unit – III & IV)
5. R.S. Agarwal, “A Modern Approach to Verbal Reasoning (Fully Solved)”, S.Chand Company Limited, New Delhi, Revised Edition, 2012. (Unit – V)

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Improve the communication skills	K1 & K2
CO2	Improve the interpersonal skills.	K1 & K2
CO3	Understand the basic concepts of quantitative ability.	K2, K3 & K4
CO4	Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability.	K2, K3 & K4
CO5	Compete in various competitive exams like TANCET, GATE, TNPSC, UPSC, etc.	K3, K4 & K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	M	S
CO2	M	M	S	S	S
CO3	S	M	M	S	S
CO4	S	M	S	M	S
CO5	S	M	S	S	S

S – Strong

M – Medium

L – Low



Program: BCA				
Skill Based Elective Course – III		Course Code: 20UCA5S03		Course Title: Quantitative Aptitude – II
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	2	30	2	100

Course Objectives

1. To enhance the Communication, interpersonal skills and problem solving skills.
2. To improve the basic mathematical skills and reasoning ability.
3. To help students who are preparing for any type of competitive examinations.

UNIT – I

Communication: Active Voice – Passive Voice – Question Tag – Reading Comprehension.

UNIT – II

Soft Skill: Employability Skills – Resume Preparation – Interview Tips and Questions – GD Skills – GD Etiquette – Essential Elements of a GD.

UNIT – III

Numerical Aptitude: Time & Distance – Simple Interest – Compound Interest.

UNIT – IV

Reasoning: Counting Figures: Squares and Triangles. Completion of Incomplete Pattern.

UNIT – V

Reasoning: Blood Relation Problems – Sense of Directions – Arrangement Problems – Syllogism.

Text Books

1. Hari Mohan Prasad & Uma Rani Sinha, “Objective English for Competitive Examinations”, Tata McGraw Hill Education Private Ltd., (Unit – I)



2. M. S. Rao, “Soft Skills Enhancing Employability-Connecting Campus with Corporate”, IK International Publishing House, NewDelhi, 2010. (Unit – II)
3. Alex.K, “Soft Skills-Know Yourself and Know the World”, S.Chand Company Ltd., 2011. (Unit – II)
4. R.S. Aggarwal, “Quantitative Aptitude”, S.Chand, 2010. (Unit – III & IV)
5. R.S. Agarwal, “A Modern Approach to Verbal Reasoning (Fully Solved)”, S.Chand Company Limited, New Delhi, Revised Edition, 2012. (Unit – V)

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Improve the communication skills	K1 & K2
CO2	Improve the interpersonal skills.	K1 & K2
CO3	Understand the basic concepts of quantitative ability.	K2, K3 & K4
CO4	Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability.	K2, K3 & K4
CO5	Compete in various competitive exams like TANCET, GATE, TNPSC, UPSC, etc.	K3, K4 & K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	M	S
CO2	M	M	S	S	S
CO3	S	M	M	S	S
CO4	S	M	S	M	S
CO5	S	M	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)

Skill Based Elective Course – IV		Course Code: 20UCA6SP04		Course Title: Android Programming Lab	
Semester VI	Hours/Week 3	Total Hours 45	Credits 2	Total Marks 100	

Course Objectives

1. To understand the basic concept of mobile devices and types of mobile operating system.
2. To know the concept of cross platform system architecture.
3. To use the development tools in the Android development environment.
4. To develop their own apps using the major components of Android API.
5. To use the Java programming language to build.

List of Programs

1. Sample Application about Android Resources
2. Sample Application about Layouts
3. Sample Application about Intents
4. Sample Application about user interfaces
5. Sample Application about Animations
6. Sample Application about SQLite I
7. Calculator App in Android
8. Simple Android Camera Application
9. Basic List View Demo in Android
10. Google Map in Android



Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand various mobile application development tools.	K1 & K2
CO2	Clearly known about Android.	K1 & K2
CO3	Understand user interface methods.	K1 & K2
CO4	Known about android resources.	K1, K2 & K3
CO5	To create mobile application.	K4, K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	M	S	S	S
CO3	S	S	S	S	S
CO4	S	M	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: Bachelor of Computer Applications (BCA)				
Non Major Elective Course – I		Course Code: 20UCA3N01		Course Title: Basics of Computer
Semester	Hours/Week	Total Hours	Credits	Total Marks
III	2	30	2	100

Course Objectives

1. Understand the Digital number system and their conversions.
2. Identify the operations of logic Gates.
3. Comprehend the fundamental principles of simple Arithmetic Circuits.
4. Know the design and operations of Data Processing Circuits.
5. Realize the design of sequential logic circuits.
6. Gain the knowledge about the memory elements.

UNIT – I

Introduction to Computer: Introduction – Types of Computers – Characteristics of Computers. Generations of Computers: First Generation – Second Generation – Third Generation – Fourth Generation – Fifth Generation. Classification of Digital Computers: Introduction – Microcomputers – Personal Computer – Portable Computers – Mini Computers – Super Computers – Main Frames.

UNIT – II

Number System: Introduction – Decimal Number System – Binary Number System – Binary-Decimal Conversion – Decimal Binary Conversion – Binary Addition – Binary Subtraction – Complements – 9's Complement – 10's Complement – 1's Complements – 2's Complements – BCD – Bits, Bytes, Words – Octal – Hexadecimal Number System.

UNIT – III

Anatomy of Digital Computer: Functions and Components of Computer – Central Processing UNIT – Control UNIT – Arithmetic – Logic UNIT – Memory – Registers – Addresses. Memory UNITs: RAM, ROM, PROM, EPROM, EEPROM, And Flash Memory.

**UNIT – IV**

Input Devices: Introduction – Keyboard – Mouse – Types of Mice – Connections – Mouse Pad – Trackball – Joystick – Digitizing Tablet – Scanners – Digital Camera – MICR – OCR – OMR – Bar Code Reader – Speech Input Device- Touch Screen – Touch Pad – Light Pen. Output Devices: Introduction – Monitor – Classification of Monitors – Monochrome – Gray Scale – Color – Digital Monitor – Analog Monitor – Characteristics of Monitor – Printers.

UNIT – V

Computer Software: Introduction – Operating System – Utilities – Compiler and Interpreters – Word Processor – Spreadsheets – Presentation Graphics – DBMS – Programming Languages: Machine Language – Assembly Language – High Level language – Types of High Level Language. Data Processing: Data VS Information – File Processing – Sequential File Processing – Direct Access file Processing.

Text Book

1. Alexis Leon and Mathews Leon, “Fundamentals of Computer Science and Communication Engineering”, Leon Techworld, 1998.

Reference Books

1. B Ram and Sanjay Kumar, “Computer Fundamentals”, New Age International Publishers, 5th Edition, 2014.
2. Pradeep K Sinha, Priti Sinha, “Computer Fundamentals”, BPB Publications, 2004.
3. Anita Goel, “Computer Fundamentals”, Pearson Education India, 1st Edition, 2010.



Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the Number system and conversation from one system to another system.	K1 & K2
CO2	Understand the functional concepts of Logic gates.	K2
CO3	Analyze the concept of Boolean Algebra and Simplifying the Boolean expression.	K3 & K4
CO4	Apply the knowledge to perform arithmetical operations using Logical circuit.	K3 & K4
CO5	Gain the Knowledge about memory Elements.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	M
CO2	M	M	S	S	S
CO3	M	S	S	S	S
CO4	S	S	S	S	S
CO5	M	M	S	S	S

S – Strong

M – Medium

L – Low



Program: BCA				
Non Major Elective Course – I		Course Code: 20UCA3N02		Course Title: System Administration & Maintenance
Semester	Hours/Week	Total Hours	Credits	Total Marks
III	2	30	2	100

Course Objectives

1. Understand basic concept & structure of Computer Hardware & Networking Components.
2. Identify the existing configuration of the computers & peripherals.
3. Apply their knowledge about computer peripherals to identify/rectify problems on board.
4. Integrate the PC's into Local Area Network & re-install OS .

UNIT – I

Introduction to Personal Computer: Computer System – Purposes & Characteristics of Cases – Power Supplies – Internal Components – Ports – Cables – Input Devices – Output Devices. Safe Lab Procedures and Tool Use: Safe Working Conditions and Procedures – Tools and Software used with PC Components.

UNIT – II

Computer Assembly: Open Case – Install Power Supply – Attach Components to Motherboard – Installation: Motherboard – Internal Drives – Drives in External Bays – Adapter Cards. Internal Cables Connections – Reattach Side Panels – Connection of External Cables – Boot the Computer.

UNIT – III

Fundamental Operating System: Purposes – Characteristics of Modern Operating Systems – Concepts Comparisons, Limitations, and Compatibilities – Determination of Operating System Based on Customer Needs – Installation of Operating System – Navigate a GUI (Windows) – Common Preventive Maintenance Techniques – Troubleshoot.

**UNIT – IV**

Fundamental Laptops and Portable Devices: Common Uses – Components of Laptop – Comparison of the Components of Desktop and Laptops – Configure Laptops – Mobile Phone Standards – Preventive Maintenance Techniques – Troubleshoot Laptop and Portable Devices. Fundamental Printers and Scanners: Types of Printers and Scanners – Installation and Configuration Process of Printers and Scanners – Preventive Maintenance Techniques – Troubleshoot.

UNIT – V

Fundamental Networks: Principles – Types – Concepts and Technologies – Physical Components – LAN Topologies and Architectures – Standard Organizations – Ethernet Standards – OSI and TCP/IP Models – Configuration of NIC and Modem – Establishing Connectivity – Preventive Maintenance Techniques – Troubleshoot. Fundamental Security: Security Threats – Security Procedures – Preventive Maintenance Techniques – Troubleshoot Security.

Text Book

1. David Anfinson & Ken Quamme, “IT Essentials: PC Hardware and Software Companion Guide”, Pearson Publications, 3rd Edition, 2008.

Reference Book

1. Quentin Docter, Emmett Dulaney and Toby Skandier, “CompTIA A+ Complete Review Guide: Exam 220-901, Exam 220 – 902”, Wiley Publications, 3rd Edition, 2015.



Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Enable the students to visualize the different aspects of networks, protocols and network design models.	K1 & K2
CO2	Enable the students to examine various layer design issues protocols.	K1 & K2
CO3	Enable the students to analyse and compare different LAN protocols.	K2 & K3
CO4	Enable the students to compare and select appropriate routing algorithms for a network.	K4 & K5
CO5	Enable the students to compare and select appropriate routing algorithms for a network applets.	K4 & K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	S	S	S	S	S
CO3	M	M	S	S	S
CO4	M	S	S	M	S
CO5	M	S	S	S	S

S – Strong

M – Medium

L – Low



Program: BCA				
Non Major Elective Course – II		Course Code: 20UCA4N03		Course Title: Exploring on Word
Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	2	30	2	100

Course Objectives

1. To explain the components of Microsoft Word.
2. Indicate the names and functions of the Word interface components.
3. Create, edit, save, and print documents to include documents with lists and tables.

UNIT – I

Exploring Word 2007: Working in the Word Environment – Opening, Moving Around in, and Closing a Document – Displaying Different Views of a Document – Creating and Saving a Document – Previewing and Printing a Document.

UNIT – II

Editing and Proofreading Documents: Make Changes to a Document – Insert Saved Text – Find the Most Appropriate word – Reorganize a Document Outline – Find and Replace Text.

UNIT – III

Error Corrections: Correct Spelling and Grammatical Errors – Finalize a Document – Changing the Look Quickly Format Text and Paragraphs – Manually Change the Look of Characters – Manually Change the Look of Paragraphs.

UNIT – IV

Bulleted and Numbered Lists: Create and Modify Lists – Presenting Information in Columns. Creating Table: Create a Tabular List – Present Information in a Table.

**UNIT – V**

Formatting a Table: Format Table Information – Perform Calculation in a Table – Use a Table to Control Page Layout.

Text Book

1. Joyce Cox and Team, “Step by Step 2007 Microsoft Office System”, PHI Learning Private limited, New Delhi, 2009.

Reference Book

1. Peter Weverka, “MS Office 2013 All-in-One for Dummies”, Wiley Publications, 1st Edition, 2013.

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Recognize when to use each of the Microsoft Office programs to create professional and academic documents.	K1
CO2	Create personal, academic and business documents following current professional and/or industry standards.	K1, K2 & K3
CO3	Identify and apply the menus in MS-Word.	K3, K4 & K5
CO4	Understand the editing and tables in word.	K3, K4 & K5
CO5	Understand the components of Word.	K3, K4 & K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs



PO CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	M	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low

Program: BCA



Non Major Elective Course – II		Course Code: 20UCA4N04		Course Title: Basics of Internet	
Semester	Hours/Week	Total Hours	Credits	Total Marks	
IV	2	30	2	100	

Course Objectives

1. Describe the important features of the Web and Web browser software.
2. Evaluate e-mail software and Web-based e-mail services.
3. Find, evaluate, and use online information resources.
4. Create HTML documents and enhance them with browser extensions.
5. Demonstrate the use of real-time chat and briefly describe the history of the wireless Internet.

UNIT – I

Introduction To The Internet: Computer in Business – Networking – Internet – E-mail – Resource Sharing – Gopher – World Wide Web – Telnet – Bulletin Board Service – Wide Area Information Service.

UNIT – II

Internet Technologies: Modem – Internet addressing – Physical connections – Telephone Lines – Internet browsers – Internet Explorer – Netscape Navigator.

UNIT – III

Introduction to HTML: Designing a Home Page – HTML Documents – Anchor Tag – Hyper Links.

UNIT – IV

Traditional Text and Formatting – Tables – Images – Frames

UNIT – V



Case Study: Online Passport – Online Gas Services – Online Train Reservation – Tamilnadu Government Services

Text Books

1. C Xavier, “World Wide Web with HTML”, Tata McGraw Hill Education, 2000.
2. H.M. Deital, P.J. Deital, “Internet and World Wide Web – How to Program”, PHI Learning, 4th Edition, 2007.

Reference Websites

1. <http://www.ebharatgas.com/>
2. <http://passportindia.gov.in/>
3. <https://www.irctc.co.in>
4. <http://www.tn.gov.in/>

Course Outcomes (COs)

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

CO Number	CO Statement	Knowledge Level
CO1	Learn about the Internet, Worldwide Web, as well as use Internet directories and search engines, and locate www addresses.	K1 & K2
CO2	find and evaluate information on the Web.	K2 & K5
CO3	learn the basics of e-mail, such as sending, forwarding and receiving mail, attaching documents, creating mailboxes, filters, and address books.	K1, K2, K3 & K4
CO4	Create web pages using HTML.	K5 & K6
CO5	Find, evaluate, and use online information systems.	K2, K3 & K4

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping of COs with POs



PO CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	S	M	S	S	S
CO3	S	S	S	S	S
CO4	S	M	S	S	S
CO5	S	S	S	M	S

S – Strong

M – Medium

L – Low