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]

Katteri – 636 902, Uthangarai (Tk), Krishnagiri (Dt)

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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)

SI. 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	3	25	75	100
4		Core Practical – I	20UCA1P01	Programming in Python Lab	3	3	40	60	100
5		Core – II	20UCA1C02	Digital Computer Fundamentals	5	3	25	75	100
6		Allied – I	20UMA1A01	Allied Maths – I	6	3	25	75	100
7	IV	Value Education	20UVE101	Yoga	2	2	25	75	100
Total					**30**	**20**	**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	3	25	75	100
11		Core – IV	20UCA2C04	Data Structures & Algorithms	4	3	25	75	100
12		Core Practical – II	20UCA2P02	Data Structures Using C Lab	3	3	40	60	100
13		Allied – II	20UMA2A02	Allied Maths – II	6	3	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**	**22**	**230**	**570**	**800**

SEMESTER – III									
16	III	Core – V	20UCA3C05	Programming in C++	5	3	25	75	100
17		Core Practical – III	20UCA3P03	Programming in C++ Lab	3	3	40	60	100
18		Core – VI	20UCA3C06	Web Technology	5	3	25	75	100
19		Core Practical –IV	20UCA3P04	Web Technology Lab	3	3	40	60	100
20		Core – VII	20UCA3C07	Operating Systems	6	3	25	75	100
21		Allied – III	20UCM3A01	Principles of Accountancy	6	3	25	75	100
22	IV	Non-Major Elective – I	---	Non Major Elective Course – I	2	2	25	75	100
Total					**30**	**20**	**205**	**495**	**700**
SEMESTER – IV									
23	III	Core – VIII	20UCA4C08	Relational Database Management System	4	3	25	75	100
24		Core Practical – V	20UCA4P05	Relational Database Management System Lab	3	3	40	60	100
25		Core – IX	20UCA4C09	.Net Programming	4	3	25	75	100
26		Core Practical – VI	20UCA4P06	.Net Programming Lab	3	3	40	60	100
27		Core – X	20UCA4C10	Software Engineering	5	3	25	75	100
28		Allied – IV	20UCM4A02	Cost & Management Accounting	5	3	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**	**24**	**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	4	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	4	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**	**26**	**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	4	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**	**28**	**220**	**480**	**700**
Grand Total					**180**	**140**	**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

SI. 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

SI. 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 & Maintanence	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	3	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 printf() 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 Associatively.

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 – Lamda 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/
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	3	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 I	**Hours/Week** 5	**Total Hours** 75	**Credits** 3	**Total Marks** 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 II	**Hours/Week** 4	**Total Hours** 60	**Credits** 3	**Total Marks** 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 Associatively – 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 II	**Hours/Week** 4	**Total Hours** 60	**Credits** 3	**Total Marks** 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 II	**Hours/Week** 3	**Total Hours** 45	**Credits** 3	**Total Marks** 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)				
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**