DEPARTMENT OF BACHELOR OF COMPUTER APPLICATIONS

COURSE MODULE: Fundamentals of Data Structures

Course Coordinator: Prof. Prashant R Kaigaddi				Academic Year:**2024-25**	
Department: Bachelor of Computer Application					
Course Code	**Course Title**	**Core/Elective**	**Prerequisite**	**Contact Hours** L:T: P:S	**Total Hrs/ Sessions**
BCA204	Fundamentals of Data Structures	PCC		3:0:0:0	40-45(TH)

Course Learning Objective:

- Fundamentals of data structures
- Basic concepts related to stacks, queues, linked list
- Fundamentals of trees and binary tree traversals

Teaching-Learning Process (General Instruction):

1. Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations.
2. Adopt collaborative (Group Learning) Learning in the class.
3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

Module-1

INTRODUCTION TO DATA STRUCTURES: Definition Types of data structures- Primitive & Non primitive Linear and Non-linear Operations on data structure

Dynamic memory allocation: Static& Dynamic memory allocation Memory allocation and de-allocation functions- malloc, calloc, realloc and free. Algorithm Specification, Performance Analysis, Performance Measurement

Recursion: Definition ,Types of recursions, Recursion Technique Examples - GCD, Factorial, Binomial coefficiet Ctr ,Towers of Hanoi; Comparison between iterative and recursive functions.

TLP: Power Point Presentation, Chalk and Talk

Module-2

ARRAYS: Operations on arrays; Arrays as abstract data types (ADT); Representation of Linear Arrays in memory. Traversing linear arrays; Inserting and deleting elements; Sorting – Selection sort, Bubble sort, Quick sort, Merge sort, Insertion sort; Searching - Sequential Search, Binary search; Iterative and Recursive searching;

TLP: Power Point Presentation, Chalk and Talk

Module-3

STACKS: Basic Concepts – Definition and Representation of stacks; Operations on stacks; Applications of stacks; Infix, postfix and prefix notations; Conversion from infix to postfix using stack; Evaluation of postfix expression using stack; Application of stack in function calls.

QUEUES: Basic Concepts – Definition and Representation of queues; Types of queues - Simple queues, Circular queues, Double ended queues, Priority queues; Operations on Simple queues.

TLP: Power Point Presentation, Chalk and Talk.

Module-4

LINKED LIST: Basic Concepts – Definition and Representation of linked list, Types of linked lists - Singly linked list, doubly liked list, Circular linked list, doubly circular linked list; Representation of Linked list in Memory; Operations on Singly linked lists – Traversing, Searching, Insertion, Deletion;

TLP: Power Point Presentation, Chalk and Talk

Module-5

TREES: Definition; Tree terminologies –node, root node, parent node, ancestors of a node, siblings, terminal & non-terminal nodes, degree of a node, level, edge, path, depth.

BINARY TREE: Type of binary trees - strict binary tree, complete binary tree, binary search tree and heap tree; Array representation of binary tree. Traversal of binary tree; pre-order, in-order and post-order traversal.

TLP: Power Point Presentation, Chalk and Talk

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No. Description Blooms Level

CO 1. Know the types of data structure. Describe the implementation of dynamic memory allocation and recursion.

CO 2. Describe the implementation of various methods of searching and sorting elements using array.

CO 3. Describe the concepts and implement stack and queue. Understand basic operations involved, types and applications.

CO 4. Describe basic concepts of linked list. Understand types of linked list and implement basic operations on singly linked list.

CO 5. Describe the concepts of tree data structure and traversal techniques on binary tree.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks**

Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
The question paper will have ten full questions carrying equal marks.
Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions)from each module.
Each full question will have a sub-question covering all the topics under a module.

Suggested Learning Resources:
Books

1. Ellis Horowitz and Sartaj Sahni: Fundamentals of Data Structures
2. Tanenbaum: Data structures using C (Pearson Education)
3. Kamathane: Introduction to Data structures (Pearson Education)
4. Y. Kanitkar: Data Structures Using C (BPB)
5. Kottur: Data Structure Using C
6. Padma Reddy: Data Structure Using C
7. Sudipa Mukherjee: Data Structures using C – 1000 Problems and Solutions (McGraw Hill Education, 2007))

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Subject Code: BCA204			TITLE: Fundamentals of Data Structures			Faculty: PRASHANT R KAIGADDI					
List of Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	2										2
CO-2	3	3	2	2	2							
CO-3	3	2	2		2							
CO-4	3	2	2	2	2				2	2	2	3
CO-5	3	2	2	2	2				2	2	2	3
Total												

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution - = No Contribution