Guru Nanak Dev Engineering College, Bidar

Course File
Data Structure with Application(18CS32)

Credit: 4 **Teaching Hours/Week(L:T:P)=(3:2:0)**

Hours: 50

CONTENTS

Course Objectives:

1. Explain fundamentals of data structures and their applications essential for programming/problem solving.
2. Illustrate linear representation of data structures: Stack, Queues, Lists, Trees and Graphs.
3. Demonstrate sorting and searching algorithms.
4. Find suitable data structure during application development/Problem Solv**ing.**

Pre-requisites:

- Learn any one programming language(like C & C++) because data structure is study of algorithms.
- Improve your analytical and logical skill to approach towards the problem.
- The fundamental concept of mathematics are clear so you can easily understand the terms in the data structure .

Linkages with other Courses:

1. C Programming
2. Basic Mathematics

Course Policies and Procedures:

(Expectations from students, Rules for Student Assignments, Assignment Grading System, CIE and Semester End Examinations.)

Expectations from student:

1**.** Students should have the knowledge of pre-requisite

2. Students should complete all assignments in a time bound manner

Rules forAssignment:

1. Assignment is evaluated for 10 marks. At the end of each module , assignments are provided. Total 5 assignments are given. Each assignment is evaluated for 2 Marks. Every student has to solve 5 assignments to get a total of 10 marks.

Acitivity Grading System

Acitivity will be evaluated for 10 marks and final score for assignment will be the as per rubrics

CIE and Semester End Examinations: As per the VTU regulations.

Evaluation Policy (It is only indicative, may vary from course to course):

Level of Question	**Approximate % of Question**
Understanding	20
Apply	35
Analyze / Solve	35
Design	10

Lesson Plan

Module wise distribution of Classes	Topics	Class Number	Teaching Methodology
08	**Module 1:**Initial briefing about the subject & Laying down of objectives by students for themselves	1	Interactive Class
	Data Structures, Classifications (Primitive & Non Primitive).Data structure Operations, Review of Arrays, Structures, Self-Referential Structures, and Unions	2	Lecture/PPT
	Pointers and Dynamic Memory Allocation Functions,	3	Lecture/PPT
	Representation of Linear Arrays in Memory, Dynamically allocated arrays.	4	Lecture/PPT
	Array operation:Traversing, inserting, deleting, searching, and sorting.	5	Lecture/PPT
	Multidimensional Arrays, Polynomials and Sparse Matrices.String:	6	Lecture/PPT
	Basic Terminology, Storing strings Operations and Pattern Matching algorithms. Programming	7	Lecture/PPT
	Revision and Solving Module-1 Previous VTU QP	8	
08	**Module 2:Stack:**Definition, Stack Operations, Array Representation of Stacks	9	Lecture/PPT/Video presentation
	Stacks using Dynamic Arrays,	10	Lecture/PPT
	Stack Applications: Polish notation, Infix to postfix conversion	11	Lecture/PPT
	evaluation of postfix expression.	12	Lecture/PPT
	Recursion: Factorial, GCD, Fibonacci Sequence,Tower of Hanoi,Ackerman's function .	13	Lecture/PPT
	QUEUE: Definition, Array Representation, Queue Operations,Circular queues using Dynamic arrays, Dequeues	14	Lecture/PPT
	A Mazing Problem.Multiple Stacks and Queues. Programming Examples	15	Lecture/PPT

	Revision of Stack/Queue and Recursion , solving the previous VTU question paper	16	
08	**Module 3:Linked List:**Definition, Representation of linked lists in MemoryMemory allocation; Garbage Collection	17	Lecture/PPT
	Linked list operations: Traversing, Searching, Insertion, and Deletion	18	Lecture/PPt
	Doubly Linked lists,	19	Lecture/PPT
	Circular linked lists, and	20	Lecture/PPT
	header linked lists	21	Lecture/PPT
	Linked Stacks and Queues.	22	Lecture/PPT
	Applications of Linked lists – Polynomials,Sparse matrix representation. Programming Examples	23	Lecture/PPT
	Revision of Module – 03 by solving VTU previous SEE Question paper	24	Lecture/PPT
08	**Module 4:**Terminology, Binary Trees, properties of Binary trees	25	Lecture/PPT
	Array and linked Representation of Binary Trees	26	Lecture/PPT
	Binary Tree Traversals - Inorder, postorder, preorder	27	Lecture/PPT
	Additional Binary tree operations. Threaded binary trees,	28	Lecture/PPT
	Binary Search Trees – Definition, Insertion, Deletion, Traversal, Searching	29	Lecture/PPT
	Application of Trees-Evaluation of Expression,	30	Lecture/PPT
	Programming Examples	31	
	Revision of class on Binary Tree Traversal and solving Module 4 from VTU QP	32	
08	**Module 5:** Definitions, Terminologies, Matrix and Adjacency	33	Lecture/PPT
	Representation Of Graphs, Elementary Graph operations.	34	Lecture/PPT
	Traversal methods: Breadth First Search and Depth First Search.	35	Lecture/PPT
	Insertion Sort, Radix sort,	36	Lecture/PPT
	Hash Table organizations, Hashing Functions, Static and Dynamic Hashing.	37	Lecture/PPT
	Data Hierarchy, File Attributes, Text Files and Binary Files,	38	Lecture/PPT
	Basic File Operations, File Organizations and Indexing	39	Lecture/PPT

	Revision of Module – 05 by solving VTU previous SEE Question paper	40	Lecture/PPT

Course Teaching Materials:

Teaching materials such as Notes, PPT, Videos, etc. to be attached

Module No.	Course Teaching Materials
1,2,3,4,5	Notes : https://guruprasadcse.blogspot.com
	PPT https://guruprasadcse.blogspot.com
	Videos https://guruprasadcse.blogspot.com

Virtual Laboratory:

Virtual Laboratory:https://ds1-iiith.vlabs.ac.in/data-structures-1/

Question Bank:

1. Module wise Question bank can be found on https://guruprasadcse.blogspot.com

Text Books:

List of text books

1. Fundamentals of Data Structures in C - Ellis Horowitz and Sartaj Sahni, 2 nd edition, Universities Press,2014
2. Data Structures - Seymour Lipschutz, Schaum's Outlines, Revised 1 st edition, McGraw Hill, 2014

Reference Books:

1.Data Structures: A Pseudo-code approach with C –Gilberg & Forouzan, 2 nd edition, Cengage Learning,2014
2. Data Structures using C, , Reema Thareja, 3 rd edition Oxford press, 2012
3. An Introduction to Data Structures with Applications- Jean-Paul Tremblay & Paul G. Sorenson, 2 nd Edition, McGraw Hill, 2013
4. Data Structures using C - A M Tenenbaum, PHI, 1989

5. Data Structures and Program Design in C - Robert Kruse, 2 nd edition, PHI, 1996

Journals:

https://ieeexplore.ieee.org/xpl/conhome/4690923/proceeding

Web Resources:

VTU E-learning Resources

NPTEL/MOOCS:

Data structures with Application-By Prof. Madhavan Mukund | Chennai Mathematical Institute

Software: Turbo C

Research Organizations / Industries in the field: Course Outcomes:

CO1: Learn fundamentals of data structures and their applications essential for programming/problem solving

CO2: Analyse and apply linear data structures: Stack, Queues, recursion to solve problem

CO3: Create the Linked list data structure. Make use of linked list for searching and sorting techniques, data manipulation operations

CO4: Analyse and apply non- linear data structures Trees to solve problems.

CO5: Learn fundamentals of Graphs and file structures and its Programming essentials.

CO-PO Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2											1
CO2	2	3	3											1
CO3	2	3	3											1
CO4	2	3	3											1
CO5	3	3	2											1
Avg.	**2.2**	**2**	**2.6**											**1**