GUJARAT TECHNOLOGICAL UNIVERSITY

With effective from academic year 2021-22

Syllabus for Bachelor of Vocation (B.Voc.), 2nd Semester
Branch: Software Development
Subject Name: Data Structures
Subject Code: 21120201

Type of course: Core

Prerequisite: Programming in C

Rationale: Data structure is a subject of primary importance in Information and Communication Technology. Organizing or structuring data is important for implementation of efficient algorithms and program development. Efficient problem solving needs the application of appropriate data structure during program development. Understanding of data structures is essential and this facilitates the understanding of the language. The practice and assimilation of data structure techniques is essential for programming.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory		Practical		
L	T	P	C	University exams (ESE)	Internal evaluation (PA)	External Practical /viva Exam(ESE)	Internal Practical /viva Exam(PA)	
3	-	-	3	50	-	-	-	50

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment

Contents:

Sr. No.	Practical / Hands on Exercise	Teaching Hrs.	Module Weightage
1	**UNIT–I** Concepts of Structure, Union, Array and Pointer, Program, Introduction to Algorithm- Definition and characteristics, Algorithm Design Tools- Flowchart, Pseudo code statements, Abstract Data Types, Analysis of Algorithm (Time and space analysis of algorithms-Average, best and worst case analysis), Using a sentinel value to end a program.	6	10
2	**UNIT–II** Data structure- Introduction, Need of Data Structure, Types of Data Structure- Primitive and Non-primitive, Linear and Non-Linear, Static and Dynamic, Stack- Operations on Stack- Algorithm for Push and Pop operations, Stack implementation- Array and Linked list implementation, Stack application- Infix, post fix, Prefix and Recursion, Queue- Introduction, Representation of queues, Operations on Queues, Implementation of queue, Circular queue, Dequeue, Priority queue, Applications of queue.	10	25

3	**UNIT–III** Introduction to the Linked List, Comparison between Array and Linked List, Representation and Implementation of Linked list, Header node, Types of Linked List- Singly Linked List, Circular linked list, Doubly Linked List, Applications of Linked List.	10	25
4	**UNIT–IV** TREES - Basic Terminology, Binary Trees, Tree Representations as Array & Linked List, Types of Binary tree, Traversal of binary trees- In order, Preorder & post order, Application of Trees, Binary Search Tree, threaded binary tree, B- tree & Height balanced tree, B+ tree, 2-3 trees, Counting binary trees GRAPH- Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs, Graph Traversal-Depth first & Breadth first search, Spanning Trees, minimum spanning Tree- Prim's Algorithm, Shortest path algorithm- Dijkstra Algorithm.	8	20
5	**UNIT–V** Hashing and File Structures- Hash Table, Collision resolution Techniques, Searching and Sorting- Sequential Searching, Binary search, Introduction of Sorting, Insertion sort, Selection sort, Quick sort, Bubble sort, Heap sort, Comparison of sorting methods.	8	20
	Total	**42**	

Reference Books:

1. Data Structures, R.S. Salaria, Khanna Publishing House
2. An Introduction to Data Structures with Applications. by Jean-Paul Tremblay & Paul G. Sorenson Publisher-Tata McGraw Hill. Web Technologies, Black Book, dreamtech Press
3. Data and File Structures using C, Thareja,Reema Oxford University Press New Delhi 2011
4. Data Structures through C (A Practical Approach), G. S. Baluja, Dhanpat Rai & Co.

Suggested Specification table with Marks (Theory): (For BVOC only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	20	0	0	0

5. Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

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Course Outcomes:

Sr. No.	CO Statement	Marks % Weightage
CO-1	Understand and development the program development cycle.	10
CO-2	Differentiate primitive and non primitive structures.	25
CO-3	Design and apply appropriate data structures for solving computing problems	25
CO-4	Apply appropriate data structures for developing various applications.	20
CO-5	Apply sorting and searching algorithms to the small and large data sets	20

Laboratory work: NA

List of Open Source Software/learning website :

Students must refer to following sites to enhance their learning ability.
1) Vlabs.iitb.ac.in
2) NPTEL tutorials
3) www.coursera.org
4) www.udacity.com