MARIS STELLA COLLEGE (AUTONOMOUS),VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Computer Science **Semester: II**

Course Title: Data Structures using C++ **Course Code: 20CSCCDS23**

No. of Hours: 60 **LTP: 400** **Credits: 3**

Objectives

- To familiarize the fundamentals of data structures.
- To impart knowledge of complexity of basic operations like insert, delete, search on these data structures.
- To build the ability to choose a data structure to suitably model any data used in computer applications.

Course Outcomes

CO1: Identify data structures to represent data items in the real world.

CO2: Analyse the working principles and applications of data structures.

CO3: Develop programs by applying various operations on data structures.

CO4: Apply various sorting, searching and hashing techniques.

UNIT–I **(12 Hrs.)**

Data structures, Data structure Operations. Linear and Non Linear data structures, Data Structures Algorithm: Linear Arrays – Operations, Representation of single, two dimensional arrays, Singly Linked Lists- Operations, Circularly linked lists - Doubly Linked Lists- operations. sparse matrices-array and linked representations - programming exercises.

UNIT–II **(12 Hrs.)**

Stack- Operations, Array and Linked Implementations, Applications - Infix to Postfix Conversion, Postfix Expression Evaluation.

Queue - Definition and Operations, Array and Linked Implementations, Circular Queues - Insertion and Deletion Operations, Dequeue (Double Ended Queue).Priority Queue- Implementation - programming exercises.

UNIT–III **(12 Hrs.)**

Trees - Representation of Trees, Binary tree, Properties of Binary Trees. Binary tree Representations - Array and Linked

Representations, Binary Tree Traversals, Heap - Definition, Insertion and Deletion -programming exercises.

UNIT–IV **(12 Hrs.)**

Graphs, Graph ADT, Graph Representations, Graph Traversals, Searching (BFS, DFS), Static Hashing- Introduction, Hash Tables, Hash Functions - programming exercises.

UNIT– V **(12 Hrs.)**

Searching techniques: Binary Search & Linear Search.

Sorting Methods : Selection, Merge, Quick, Heap. Comparison of Sorting Methods.

Search Trees- Binary Search Trees, AVL Trees- Definition and Examples - programming exercises.

Co-Curricular Activities

- Assignments on problem solving
- Student presentations and seminars
- Online quizzes

Prescribed Book

Fundamentals of Data structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson- Freed, Universities Press.

Reference Books

1. Data structures and Algorithm Analysis in C, 2nd edition, M. A. Weiss, Pearson.
2. Lipschutz: Schaum’ s outline series Data structures Tata McGraw – Hill

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

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Blueprint

Subject: Computer Science **Semester: II**

Course Title: Data Structures using C++ **Course Code: 20CSCCDS23**

Time: 3 Hrs. **Max. Marks: 100**

SECTION – A

Answer **ALL** questions **20 x 1 = 20M**

Q. No.	UNIT	Marks Weightage	RBT LEVEL
1	I	1	**No. of questions to be set** RBT1 – 8 RBT2 – 8 RBT3 – 2 RBT4 – 2
2	I	1	
3	II	1	
4	II	1	
5	III	1	
6	III	1	
7	IV	1	
8	IV	1	
9	V	1	
10	V	1	
11	I	1	
12	I	1	
13	II	1	
14	II	1	
15	III	1	
16	III	1	
17	IV	1	
18	IV	1	
19	V	1	
20	V	1	

SECTION – B

Answer any **FOUR** questions **4 x 8 = 32M**

Q. No.	UNIT	Marks Weightage	RBT LEVEL
21	I	8	**No. of questions to be set**
22	II	8	RBT1 – 2
23	III	8	RBT2 – 2
24	IV	8	RBT3 – 1
25	V	8	RBT4 – 1
26	I / II / III / IV / V	8	

SECTION – C

Answer any **FOUR** questions **4 x 12 = 48M**

Q. No.	UNIT	Marks Weightage	RBT LEVEL
27	I	12	**No. of questions to be set**
28	II	12	RBT1 – 2
29	III	12	RBT2 – 2
30	IV	12	RBT3 – 1
31	V	12	RBT4 – 1
32	I / II / III / IV / V	12	

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

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Model Question Paper

Subject: Computer Science **Semester: II**

Course Title: Data Structures using C++ **Course Code: 20CSCCDS23**

Time: 3 Hrs. **Max. Marks: 100**

SECTION – A

Answer **ALL** questions **20 x 1 = 20 M**

1. A queue is called as _____ system, is a linear list in which deletions can take place only at one end of the list, front of the list, and insertions can take place only at other end of the list, rear of the list.
   A. FIFO
   B. LIFO
   C. LIFO, followed by FIFO
   D. FIFO followed by LIFO
2. Accessing each record exactly once so that the certain elements in the records may be processed is called _____.
   A. Inserting
   B. Deleting
   C. Searching
   D. Traversing
3. Single linked list or one way consists of Nodes, thus Node is partitioned in to two parts, they are ____ and ____.
   A. Order and Preference
   B. Information , Address of the next node
   C. Data and Invalid Operator
   D. Stack and Queue
4. In the representation of the Stack in memory, if TOP=3 and MAX STK=8, ____ are the free rooms left in the stack.
   A. 3
   B. 8
   C. 5
   D. 0
5. A Circular queue or a ring buffer is a linear queue based on _____
   A. LIFO
   B. FIFO
   C. LILO
   D. FILO

6. _____returns a graph with v inserted. v has no edge.
   A. insertvertex(graph, v)
   B. InsertVertex(graph, v)
   C. Insertvertices(graph, v)
   D. InsertVertex(graph)
7. _____is an effective way to reduce the number of comparisons to search an element in a data structure.
   A. Hashing
   B. Static hashing
   C. Dynamic Hashing
   D. Limited process
8. In binary search, to find the middle element DATA[MID] of the segment, where is MID is obtained by _____.
   A. INT((BEG-END)/2)
   B. INT((BEG+END)/2)
   C. INT((BEG*END)/2)
   D. INT((BEG*END)/2)
9. _____ can be defined as height balanced binary search tree in which each node is associated with a balance factor.
   A. Binary Tree
   B. AVL Tree
   C. Binary Search Tree
   D. Linear Search Tree
10. In 2D array representation of sparse matrix, the three fields are ___.
   A. Row, col, value
   B. Col, row, value
   C. Value, row, col
   D. Value col, row
11. The problem of sorting a set is reduced to problem of sorting two reduced sets is called _____.
12. The value of the root node is less than or equal to either of its children is called _____.
13. Data may be organized in many different ways; the logical or mathematical model of a particular organization of the data is called _____.
14. _____ is a dequeue which allows insertions only at one end and allows deletions at both ends.

15. _____ is a tree data structure in which every node have a maximum of 2 children name left child and right child.
16. In _____ traversal, the root node is visited after left child and right child.
17. A _____ is a non-linear data structure and comprises a collection of vertices and edges.
18. Acronym for DFS is _____.
19. The problem of sorting a set is reduced to problem of sorting two reduced sets is called _____.
20. In queues if FRONT = NUL, it indicates Queue is _____.

SECTION – B

Answer any **FOUR** questions **4 x 8 = 32 M**

21. Explain the concept of linear array and it's any two operations with example using C++.
22. Define Infix and Postfix. Explain the Infix to Postfix Conversion with example.
23. What is Heap? Explain insertion and deletion operations with examples using C++.
24. Demonstrate the concept DFS with example using C++.
25. What is a binary search tree? Demonstrate how to find the balance factor in AVL tree with example.
26. Write a program for binary search with example using C++.

SECTION – C

Answer any **FOUR** questions **4 x 12 = 48 M**

27. Explain the concept of single linked list and operations with example using C++.
28. Explain about Stack and its implementations with example using C++.
29. Explain the concept of Binary tree and its representations with examples using C++.
30. Define static hashing with hash tables and explain hash functions with examples.
31. Explain in detail about merge sort with example using C++.
32. Explain about Queues and its implementations with example using C++.