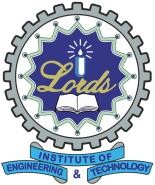
**LORDS INSTITUTE OF ENGINEERING AND TECHNOLOGY**

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**EXAMINATION BRANCH**

**SEE- QUESTION BANK-DATA STRUCTURES**

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| --- | --- | --- | --- |
| **CourseName:** | **Data Structures** | **Year/Sem:** | II/III |
| **CourseCode:** | **U23CS302** | **Month/Year:** | JAN/2024 |
| **Name of the Faculty:**Dr.Md.Abdul Wajeed ,Mrs.Farheen Sultana,Mr.Rizwan Uz zaman wani | | | |

# Short Answer Questions-2Marks

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| **S.NO** | **QUESTION** | **MARKS** | **CO**  **Mapping** | **BTL** |
| **UNIT-I** | | | | |
| **1** | What is an Algorithm? List the characteristics of Algorithm? | 2M | CO1 | BTL1 |
| **2** | What is the difference between Big-Omega Ω and **Theta Notation (Θ) ?** | 2M | CO1 | BTL1 |
| **3** | What is Recursion explain with example? | 2M | CO1 | BTL2 |
| **4** | What is Recursive Algorithm? | 2M | CO1 | BTL1 |
| **5** | What is Performance Analysis of an Algorithm? | 2M | CO1 | BTL1 |
| **6** | What is Asymptotic Notation and what are its types? | 2M | CO1 | BTL1 |
| **7** | What is big-O notation? | 2M | CO1 | BTL1 |
| **8** | Explain the following   1. Linear data structures 2. Nonlinear data structures | 2M | CO1 | BTL2 |
| **9** | What is Time Complexity of an algorithm? | 2M | CO1 | BTL1 |
| **10** | What do u mean by best-case time complexity of an Algorithm? | 2M | CO1 | BTL1 |
| **11** | How is Big Omega (Ω) notation different from Big oh (O) notation? | 2M | CO1 | BTL2 |
| **12** | What is Theta Notation? | 2M | CO1 | BTL1 |
| **13** | Define data structures and give its applications? | 2M | CO1 | BTL1 |
| **14** | Define data abstraction? | 2M | CO1 | BTL1 |
| **15** | Define space complexity what is its importance in evaluating of algorithms? | 2M | CO1 | BTL1 |
| **Long Answer Questions-7 Marks** | | | | |
| **S.NO** | **QUESTION** | **MARKS** | **CO**  **Mapping** | **BTL** |
| **UNIT-I** | | | | |
| **1** | Explain recursion. Write a recursive algorithm to calculate factorial of a number? | 7M | CO1 | BTL2 |
| **2** | Evaluate the time complexity for the following iterative function?  float sum(float \*a, const int n)  {  float s=0; for(inti=0;i<n;i++) S+=a[i];  return s;  } | 7M | CO1 | BTL2 |
| **3** | Write about Asymptotic Notations. Give suitable example for each asymptotic notation? | 7M | CO1 | BTL2 |
| **4** | Explain Performance Analysis in Detail.   1. Time Complexity 2. Space Complexity | 7M | CO1 | BTL2 |
| **5** | Define data structure? classify data structures with suitable examples? | 7M | CO1 | BTL1 |
| **6** | Compare and contrast time and space complexity with suitable examples? | 7M | CO1 | BTL2 |
| **7** | Define and explain recursive algorithms with an example? | 7M | CO1 | BTL1 |
| **8** | Differentiate between linear and non linear data structures? | 7M | CO1 | BTL2 |
| **9** | Explain about importance of Time Complexity in data Structure? | 7M | CO1 | BTL2 |
| **10** | Explain about Operations on Data Structures ? | 7M | CO1 | BTL2 |
| Short Answers Questions-2 Marks | | | | |
| **S.NO** | **QUESTION** | **MARKS** | **CO**  **Mapping** | **BTL** |
| **UNIT-II** | | | | |
| **1** | Define Stack? List the applications of stack? | 2M | CO2 | BTL1 |
| **2** | Define Queue? List the applications of queue? | 2M | CO2 | BTL1 |
| **3** | Write an Algorithm to Check Valid Parentheses in an Expression using Stack? | 2M | CO2 | BTL1 |
| **4** | What are the advantages of using queues over other data structures? | 2M | CO2 | BTL1 |
| **5** | What are the advantages of using stacks over other data structures? | 2M | CO2 | BTL2 |
| **6** | Write insertion function in Queue? | 2M | CO2 | BTL1 |
| **7** | If the elements “A”, “B”, “C” and “D” are placed in a stack and are deleted one at a time, write the order of removal? | 2M | CO2 | BTL1 |
| **8** | Differentiate between Stack and Queue? | 2M | CO2 | BTL2 |
| **9** | Define Circular Queue? | 2M | CO2 | BTL1 |
| **10** | Define Dequeue? | 2M | CO2 | BTL1 |
| **11** | Define stack underflow and overflow with its condition.? | 2M | CO2 | BTL1 |
| **12** | What is a Stack ADT (Abstract Data Type)? Explain its properties | 2M | CO2 | BTL2 |
| **13** | Describe the primary operations performed on a queue.? | 2M | CO2 | BTL1 |
| **14** | What is the Complexity Analysis of Queue operations? | 2M | CO2 | BTL1 |
| **15** | **Write the process of converting infix expressions to postfix notation** using a stack.? | 2M | CO2 | BTL1 |
| **Long AnswerQuestions-7 Marks** | | | | |

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| **S.NO** | **QUESTION** | **MARKS** | **CO**  **Mapping** | **BTL** |
| **UNIT-II** | | | | |
| **1** | Evaluate the following postfix expression: 6 2 3 + - 3 8 2 / + \* 2 / 3 + | 7M | CO2 | BTL4 |
| **2** | Evaluate the postfix expression 6 2 3 + - 3 8 2 / + \* 2 ^ 3 + | 7M | CO2 | BTL4 |
| **3** | Evaluate the postfix expression 1 2 + 3 \* 6 + 2 3 + / | 7M | CO2 | BTL4 |
| **4** | Convert Infix to Postfix Expressions ((A+(B-C)\*D)^E+F) | 7M | CO2 | BTL2 |
| **5** | Explain how to implement Stack using array? | 7M | CO2 | BTL4 |
| **6** | Convert the expression ((A + B) \* C - (D - E) ^ (F + G)) into equivalent Postfix notation. | 7M | CO2 | BTL4 |
| **7** | Transform the following expression to postfix expression using stacks. (A+B)\*((D-E)+F) | 7M | CO2 | BTL3 |
| **8** | Explain stack and how to implement stack using array. | 7M | CO2 | BTL2 |
| **9** | Write C programs to implement queue using Arrays? | 7M | CO2 | BTL2 |
| **10** | Evaluate the postfix expression 10 2 8 \* + 3 -1 2 3 \* +- | 7M | CO2 | BTL4 |
| Short Answer Questions-2Marks | | | | |
| **S.NO** | **QUESTION** | **MARKS** | **CO**  **Mapping** | **BTL** |
| **UNIT-III** | | | | |
| **1** | What is linked list ? difference between singly and doubly linked list? | 2M | CO3 | BTL1 |
| **2** | Explain the different operations performed on singly linked list? | 2M | CO3 | BTL2 |
| **3** | Explain concatenation of singly linked lists? | 2M | CO3 | BTL1 |
| **4** | Define Doubly Linked List with example? | 2M | CO3 | BTL1 |
| **5** | Define Circular Linked List with example? | 2M | CO3 | BTL1 |
| **6** | Write and explain structure definition of singly linked list? | 2M | CO3 | BTL2 |
| **7** | Differentiate between Arrays and linked list? | 2M | CO3 | BTL2 |
| **8** | List the operations of doubly linked list? | 2M | CO3 | BTL1 |
| **9** | List the operations of circular linked list? | 2M | CO3 | BTL1 |
| **10** | **List the applications** of circular linked list? | 2M | CO3 | BTL1 |
| **11** | Differentiate between single and doubly linked list? | 2M | CO3 | BTL2 |
| **12** | What is a circular linked list? | 2M | CO3 | BTL1 |
| **13** | How can a queue be implemented using a linked list? | 2M | CO3 | BTL2 |
| **14** | How can a stack be implemented using a linked list? | 2M | CO3 | BTL1 |
| **15** | **What is a doubly linked list?** | 2M | CO3 | BTL1 |
| **Long AnswerQuestions-7 Marks** | | | | |
| **S.NO** | **QUESTION** | **MARKS** | **CO**  **Mapping** | **BTL** |
| **UNIT-III** | | | | |  |  |  |  |
| **1** | What is double linked list? Explain insertion and deletion operations with example. | 7M | CO3 | BTL2 |
| **2** | Explain circular linked list operations? | 7M | CO3 | BTL2 |
| **3** | List the advantages and disadvantages of doubly linked list over singly linked list? | 7M | CO3 | BTL1 |
| **4** | Write a function to delete an element form specified position in double linked list. | 7M | CO3 | BTL1 |
| **5** | Explain the following operations in a doubly linked list: Insert an element  Delete an element Reverse the list | 7M | CO3 | BTL2 |
| **6** | Explain the following operations on Single Linked List.  i) Insertion at the begin  ii) Deletion at the end | 7M | CO3 | BTL2 |
| **7** | What is a Singly Linked List? Write the function for the following  i. creation of a node  ii. deletion of node | 7M | CO3 | BTL1 |
| **8** | Write a C function to insert an element in between two nodes in a Single linked list? | 7M | CO3 | BTL1 |
| **9** | List the advantages and disadvantages of linked list | 7M | CO3 | BTL1 |
| **10** | Write a program for single linked list all operations | 7M | CO3 | BTL1 |
| Short Answer Questions-2Marks | | | | |
| **S.NO** | **QUESTION** | **MARKS** | **CO**  **Mapping** | **BTL** |
| **UNIT-IV** | | | | |
| **1** | Define with example complete binary tree? | 2M | **CO4** | BTL1 |
| **2** | Define with example full binary tree? | 2M | **CO4** | BTL1 |
| **3** | List the properties of binary tree? | 2M | **CO4** | BTL1 |
| **4** | List the different types of binary tree? | 2M | **CO4** | BTL1 |
| **5** | State the difference between complete binary tree and full binary tree? | 2M | **CO4** | BTL2 |
| **6** | Write the different binary tree traversals? | 2M | **CO4** | BTL1 |
| **7** | Write the advantages of threaded binary tree. | 2M | **CO4** | BTL1 |
| **8** | Define Skewed binary tree with example? | 2M | **CO4** | BTL1 |
| **9** | Define Minimum Cost Spanning Tree? | 2M | **CO4** | BTL1 |
| **10** | What is graph? List the types of graph with example? | 2M | **CO4** | BTL1 |
| **11** | List out different representations of graph? | 2M | **CO4** | BTL1 |
| **12** | What is DFS? | 2M | **CO4** | BTL1 |
| **13** | What is BFS? | 2M | **CO4** | BTL1 |
| **14** | Define Heap tree with example? | 2M | **CO4** | BTL1 |
| **15** | Define Spanning Tree and how to calculate the number of Spanning trees formed from a Graph? | 2M | **CO4** | BTL1 |
| **Long AnswerQuestions-7 Marks** | | | | |
| **S.NO** | **QUESTION** | **MARKS** | **CO**  **Mapping** | **BTL** |
| **UNIT-IV** | | | | |
| **1** | Define AVL trees. Explain all the rotations with example | 7M | **CO4** | **BTL2** |
| **2** | Apply Prim's Algorithm for the following graph and what is the minimum cost.  (Diagram) | 7M | **CO4** | BTL4 |
| **3** | Describe the insertion, deletion operations on binary search trees? | 7M | **CO4** | BTL2 |
| **4** | Explain about Kruskal's Algorithm? Apply on the following graph?  IMG_256 | 7M | **CO4** | BTL4 |
| **5** | Construct the binary search tree for the following elements and write in order, pre order, post order traversal. 43,10,80,91,12,50,11,8,49,57 | 7M | **CO4** | BTL4 |
| **6** | Define tree traversals of binary tree ?Write in-order, pre-order, post order traversal of the following tree  http://upload.wikimedia.org/wikipedia/commons/thumb/f/f7/Binary_tree.svg/192px-Binary_tree.svg.png | 7M | **CO4** | BTL2 |
| **7** | Explain the breadth first search and depth first search graph traversal algorithms for the following graph? | 7M | **CO4** | BTL2 |
| **8** | Given In order traversal of a binary tree is **D,G,B,E,A,H,F,I,C** and pre order traversal is **A,B,D,G,E,C,F,H,I** construct binary tree | 7M | **CO4** | BTL4 |
| **9** | Explain heap tree ? Construct Min Heap and Max Heap trees for the following  **35,33,42,10,14,19,27,44,26,31** | 7M | **CO4** | BTL4 |
| **10** | What is AVL tree construct AVL tree for the following?  **20,30,80, 40,10, 60 ,50 ,70** | 7M | **CO4** | BTL4 |
| Short Answer Questions-2Marks | | | | |
| **S.NO** | **QUESTION** | **MARKS** | **CO**  **Mapping** | **BTL** |
| **UNIT-V** | | | | |
| **1** | What is hashing? What is collision in hashing? | 2M | **CO5** | BTL2 |
| **2** | Define a hash function and list out popular hash functions? | 2M | **CO5** | BTL1 |
| **3** | Differentiate between insertion and bubble sort? | 2M | **CO5** | BTL2 |
| **4** | Explain quick sort? | 2M | **CO5** | BTL2 |
| **5** | Differentiate between insertion and selection sort? | 2M | **CO5** | BTL3 |
| **6** | What is merge sort explain? | 2M | **CO5** | BTL1 |
| **7** | Explain Bubble sort with example? | 2M | **CO5** | BTL2 |
| **8** | Define max and min heap | 2M | **CO5** | BTL1 |
| **9** | Define insertion sort? | 2M | **CO5** | BTL1 |
| **10** | What is bubble sort.? | 2M | **CO5** | BTL1 |
| **11** | **What is static hashing?** | 2M | **CO5** | BTL1 |
| **12** | **What are common hash functions** used in hash tables? | 2M | **CO5** | BTL1 |
| **13** | **What is the Selection Sort algorithm?** | 2M | **CO5** | BTL1 |
| **14** | What techniques are used to handle overflow? | 2M | **CO5** | BTL2 |
| **15** | **Compare Merge Sort and Quick Sort.** | 2M | **CO5** | BTL2 |
| **Long AnswerQuestions-7 Marks** | | | | |
| **S.NO** | **QUESTION** | **MARKS** | **CO**  **Mapping** | **BTL** |
| **UNIT-V** | | | | |
| **1** | Sort the following numbers using heap sort **5, 23,7,18,2,1,9,15,6,4,8,3,13** | 7M | **CO5** | BTL4 |
| **2** | Explain the following:   1. Hashing 2. Hash table 3. Hash Function | 7M | **CO5** | BTL2 |
| **3** | Differentiate between linear and binary search? | 7M | **CO5** | BTL3 |
| **4** | Write a program for insertion sort? | 7M | **CO5** | BTL2 |
| **5** | Insert keys **3,8, 22, 23, 4, 10, 9, 12, 44, 15** into hash table and construct hash table by using open addressing. | 7M | **CO5** | BTL4 |
| **6** | sort the following using Quick Sort and explain. **12,5,8,23,4,16,9,10,3,2,15,32,44** | 7M | **CO5** | BTL3 |
| **7** | Consider the hash function H(i)=(2i+5)%11  Insert keys **3,8, 102, 23, 4, 10, 9, 12, 44, 15** and construct the 11item hash table by using open addressing.? | 7M | **CO5** | BTL3 |
| **8** | Explain the collision resolution technique double hashing and linear probing with suitable example? | 7M | **CO5** | BTL2 |
| **9** | Sort the following using merge sort **12,34,23,21,13,56,42,11,9,8,10?** | 7M | **CO5** | BTL2 |
| **10** | Explain the following with example?   1. Linear probing 2. Quadratic probing | 7M | **CO5** | BTL2 |

**Course Coordinator** **Board of Examiners** **HoD**