(Please Write Your Enrolment No. immediately)

Student Name.. .....

EnrolmentNo 0231X611921

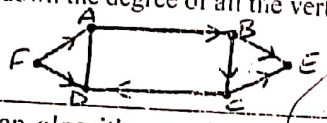
Class Test- JAN. 2023

Programme: B.Tech(AI&DS, AI&ML)
PaperCode:AIDS 201/AIML 201
Time:1.5hours

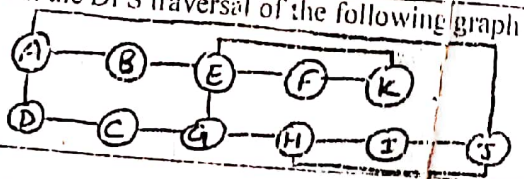
Semester:III
Subject: Data Structure
Max.Marks:30

Note:

- **Q. No.1 is compulsory.**
- **Attempt any two questions from the remaining questions.**
- **All Questions carry equal marks.**
- **Only scientific calculator is allowed.**

Question 1.		Marks	CO	BL
1(a)	Define Node, Root, depth, height and Degree in tree data structure with example.	[2.5]	3	Understand
1(b)	Define Graph, Weighted graph and Complete graph.	[2.5]	4	Understand
1(c)	Write down the degree of all the vertices in the given graph 	[2.5]	4	Evaluate
1(d)	Write an algorithm to delete a node in a tree with two children.	[2.5]	3	Create

Question 2.		Marks	CO	BL
2(a)	Construct a Binary search tree for the elements inserted in the following order: 50,70,90,93,100,20,10,5,9,25,51,15,95	[5]	3	Create
2(b)	Construct the binary tree if preorder and inorder traversal is given: Preorder: A B C D F H J M K E G I L N Inorder: A D J M H K F C I N L G E B	[5]	3	Create

Question 3.		Marks	CO	BL
3(a)	Construct an AVL tree resulting from the insertion of the following integers: 50,72,96,94,107,26,12,11,9,2	[5]	4	Create
3(b)	Find out the DFS traversal of the following graph 	[5]	4	Analyze

Question 4.		Marks	CO	BL
4(a)	Construct an B tree of order 5 with the elements:65,72, 96,99,100,107,26,12,11,92,10,25,51,21,48,54,76,69	[5]	3	Create
4(b)	How graphs are represented in memory. Explain two ways of representation.	[5]	4	Remember

Exam Roll No.) Exam Roll No. .....

(Please Write Your Enrolment. No. Immediately)

Student Name.....

Enrolment No..

Mid Term Examination- NOV. 2022

Programme: B. Tech(AI&DS, AI&ML, IIOT) **Semester:** III

Paper Code : AIDS 201/AIML 201/IIOT 201 **Subject:** Data Structure

Time: 1.5 hours **Max. Marks:** 30

Note:

- **Q. No. 1 is compulsory.**
- **Attempt any two questions from the remaining questions.**
- **All Questions carry equal marks.**
- **Only scientific calculator is allowed.**

Question 1.		Marks	CO	BL
1(a)	Explain Space and Time Tradeoff.	[2.5]	1	Understand
1(b)	Differentiate between Singly, circular and doubly Linked list.	[2.5]	2	Analyze
1(c)	Assume that 4 byte of storage is required to store each element of an array of integers A[12][15]. What will be the actual address of the element at A[6][5]. Assume Base address is 1000.	[2.5]	1	Evaluate
1(d)	Write an algorithm to search an element in an array using Linear Search.	[2.5]	2	Create

Question 2.		Marks	CO	BL
2(a)	Using stack translate the infix expression A*(B+C)/D-E*(F+G/H) into equivalent Postfix expression.	[5]	1	Apply
2(b)	Explain insertion and deletion process in a Queue with an example.	[5]	1	Understand

Question 3.		Marks	CO	BL
3(a)	Write an algorithm to add a node at the end of Circular Linked List. Explain with the help of an example.	[5]	2	Create
3(b)	Sort the following list using Quick Sort. Show the step by step process 44, 25, 76, 13, 67, 60, 96, 38, 98, 89	[5]	2	Evaluate

Question 4.		Marks	CO	BL
4(a)	Write an algorithm to reverse a singly linked list.	[5]	2	Understand
4(b)	Write an algorithm to add an element in an array. Explain with the help of an example.	[5]	1	Remember

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END TERM EXAMINATION

THIRD SEMESTER [B.TECH] FEBRUARY-2023

Paper Code: AIDS/ AIML/IOT-201	Subject: Data Structures
Time: 3 Hours	Maximum Marks: 75

Note: Attempt any five questions including Q.No1 which is compulsory. Select one question from each unit. Scientific calculators are allowed.

Q1. Attempt the following questions: **(2.5x6 = 15)**

a) What is the condition to check overflow and underflow condition in a queue?
b) List the advantages of linked lists over arrays.
c) Evaluate the following postfix expression using stacks: 320, 10, *, 10, 60, 100, *, /
d) The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function h(k) = k mod 10 and linear probing. What is the resultant hash table?
e) Discuss the time complexity to find the *nth* node from a linked list.
f) Find the root of each of the following binary trees:
   a. Tree with post order traversal: ACBDF
   b. Tree with preorder traversal: PBCDFEQ

Unit-I

Q2.

a) Convert the given expression into prefix and postfix expression using stack:
(P+Q*R)-(S+T)/U. **(7)**
b) Given an array of 8 elements [2,4,5,6,7,8,3,9]. Write the program to insert element '1' at the beginning of the array. **(8)**

OR

Q3.

a) Write a program to delete an element from Circular Queue. **(5)**
b) Consider the following operation performed on a stack of size 5. **(5)**

```
Push(1);
Pop();
Push(2);
Push(3);
Pop();
Push(4);
Pop();
Pop();
Push(5);
```

After the completion of all operation, find the number of elements present

c) Differentiate between stacks and queues with suitable examples. **(5)**

Unit-II

Q4.

a) Write an algorithm to implement binary search on given data: 11, 22, 30, 33, 40, 44, 55, 60, 66, 77, 80, 88, 99 for the item 40. Discuss the complexity of binary search. **(7)**

b) Show step by step procedure of quick sort on A= {9,-3,5,2,6,8,-6,1,3}. **(8)**

OR

Q5.

a) Demonstrate the step by step process of insertion sort of the given array:{12, 11,13, 5, 6} **(7)**

b) Define a circular linked list. Write an algorithm to delete a node from the beginning of the circular linked list. **(8)**

Unit-III

Q6.

a) Construct the AVL tree if following elements are inserted in order: 5, 20, 30, 40, 50, 60, 70, 80, 90, 100, 160, 120, 15. **(7)**

b) A binary tree has eight nodes. The post order and in order traversals of the tree are given below. Draw the tree. **(8)**
Post order: UTRWVSQP
In order: URTPQWSV

OR

Q7.

a) Explain the insertion and deletion process of a node in Binary Search Tree with appropriate examples. **(5)**

b) Explain the different traversal methods of a binary tree with appropriate examples. **(5)**

c) The task is to find sum of all elements smaller than and equal to Kth smallest element. Demonstrate the program to solve the above given task. **(5)**

Unit-IV

Q8.

a) What do you mean by hashing? Discuss any two collision resolution techniques. **(7)**

b) Create the adjacency list and adjacency matrix for the following directed graph: **(8)**

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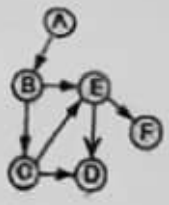
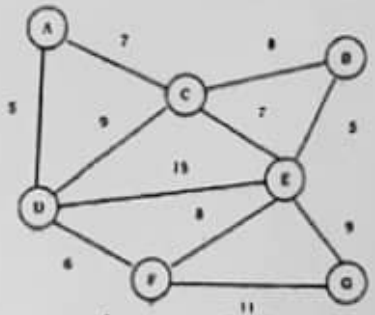


OR

Q9.

a) Create a minimum spanning tree for the following graph using Kruskal's algorithm: **(7)**



b) Differentiate between dense and sparse index with help of an example. **(8)**

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Enrollment No: 04115611923

Mid-Term Examination – Nov 2023

Programme: B.Tech (AI&ML/ AI&DS/ IIOT) | **Semester: 3rd Semester**

Paper Code: AIDS 201/AIML 201/IOT 201 | **Paper Name: Data Structures**

Time: 1½Hrs. | **Maximum Marks: 30**

Note:
- Question No. 1 is compulsory.
- Attempt any two questions from the remaining questions.
- Some questions have internal choice also.
- All questions carry equal marks.

	Question 1	Marks
1(a)	Difference between Data Structure and algorithms with example.	[2]
1(b)	Explain two disadvantages of linked list over array?	[2]
1(c)	Explain concept of algorithm complexity for binary search?	[2]
1(d)	Explain concept and application of circular linklist?	[2]
1(e)	Explain two operations of Strings with example?	[2]
	Question 2	
2(a)	What is Queue Data Structure explain with an example?	[2]
2(b)	Explain features of list, set, tuple, and dictionary data structures.	[4]
2(c)	What is Stack Data Structure? Considering Array representation of Stack write and explain algorithm for Push and Pop Operations?	[4]
	Question 3	
3(a)	Explain two advantages of using linklist over array.	[2]
3(b)	Explain the process of Radix sort with an example?	[3]
3(b)	Write algorithm for Insertion Sort and Quick sort. Compare their complexities.	[5]
	Question 4	
4(a)	Write algorithm for infix to postfix conversion? Explain the conversion of expression ((A * B) + (C / D)) using the same?	[5]
4(b)	Write algorithm for inserting and deleting a given node in middle of a doubly linklist?	[5]

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(Please Write Your Enrolment. No. Immediately)

Student Name..KASAK.....
Enrolment No..02715611922

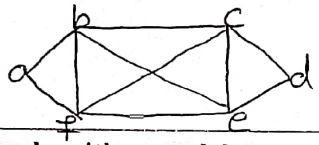
Class Test- DEC. 2023

Programme: B. Tech(AI&DS, AI&ML)
Paper Code : AIDS 201/AIML 201
Time: 1 hours

Semester: III
Subject: Data Structure
Max. Marks: 30

Note:

- Q. No. 1 is compulsory.
- Attempt any two questions from the remaining questions.
- All Questions carry equal marks.
- Only scientific calculator is allowed.

Question 1.		Marks	CO	BL
1(a)	Define Node, Root and Degree in tree data structure with example.	[2.5]	3	Understand
1(b)	Explain spanning tree with the help of an example.	[2.5]	4	Understand
1(c)	Write down the degree of all the vertices in the given graph 	[2.5]	4	Evaluate
1(d)	Write an algorithm to delete a node in BST with one child.	[2.5]	3	Create

Question 2.		Marks	CO	BL
2(a)	Construct an AVL tree for the elements inserted in the following order: 2,26,1,20,3,30,24,15,35,39	[5]	3	Create
2(b)	Construct the binary tree if postorder and inorder traversal is given: In-order: DBMINEAFCJGK Post-order: ABDEIMNCFGJK	[5]	3	Create

Question 3.		Marks	CO	BL
3(a)	Construct an Binary Search tree resulting from the insertion of the following elements: 20,17,6,8,10,7,18,13,12,5	[5]	4	Create
3(b)	Explain Kruskal's algorithm with an example.	[5]	4	Evaluate

Question 4.		Marks	CO	BL
4(a)	Construct an B tree of order 4 with the elements:65, 72, 96,99,100,107,26,12,11	[5]	3	Create
4(b)	How graphs are represented in memory. Explain any one way of representation with the help of an example.	[5]	4	Remember

(Please write your Exam Roll No.) Exam Roll No. 02715611922

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] JANUARY 2024

Paper Code: AIML/IIOT/AIDS-201 **Subject: Data Structures**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit. Assume missing data if any.

Q1 Attempt all questions:

i) What is Data Structures? Why do we need data structures? In how many ways can you classified the data structures? **(3)**

ii) Explain features of list, set, tuples, and dictionary data structures. **(3)**

iii) Given a sorted list of numbers {1,13,19,25,38,55,70,80}. Search for value 70 using Binary Search Algorithm. **(3)**

iv) Explain threaded binary tree? **(3)**

v) Explain Topological sort with the help of example. **(3)**

UNIT-I

Q2 a) Write an algorithm/function to convert the infix expression into prefix expression using stack. Using the above algorithm convert the following infix expression into prefix using stack. **(7)**

P*O/R+(S-T*U)

b) What is Circular Queue? Why Circular Queue better than Linear Queue? Write an algorithm/function for enqueue and dequeue operations on Circular Queue? **(8)**

OR

Q3 a) What is an array? How multidimensional array are stored in memory? Consider a 2-D float array A [5:10][6:10] is stored in row –wise form in the memory. Suppose the base address of an array A is 800. **(5)**

i) Find the total number of elements in an array A.

ii) Find the address of A[7][7]

b) Write a function/algorithm to evaluate the postfix expression using stacks? Using above algorithm evaluate the following expression: 3,4,5,6,*,+,7,-,/ **(5)**

c) What is Deque? Write an algorithm for deletion at rear end in a Deque? **(5)**

UNIT-II

Q4 a) What is linked list? Explain advantages and disadvantages of linked list over an array? Write an algorithm/function to insert an element at the end of the linear linked list. **(8)**

b) Write an algorithm/function for Quick Sort. Perform quick sort on the following values. Assume 48 as Pivot point. **(7)**

48, 37, 12, 78, 19, 50, 22, 60

P.T.O.

AIML/IIOT/AIDS-201

OR

Q5 a) What is doubly linked list? Write a program to create a doubly linked list having information about a student such as name, roll no, marks etc. and perform insertion and deletion of a node from the beginning. **(8)**

b) Write an algorithm for Radix Sort. Perform the radix sort on the following values. **(7)**

380, 489, 567, 235, 323, 755, 155

UNIT-III

Q6 a) What is B-tree? Compare B- tree with B+ trees. Construct B-tree of order 5 by inserting the following elements in the order of their occurrence. **(8)**

M, T, E, Q, K, C, G, N, H, U, W,

b) The pre-order and in-order traversal of a binary tree are given below. Construct corresponding binary tree. Write its equivalent post-order traversal. Write a recursive algorithm/ function for post-order traversal. **(7)**

Pre-order: A, B, D, C, E, G, F, H, I
In-order: D, B, A, E, G, C, H, F, I

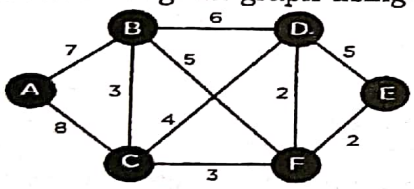
OR

Q7 a) What is Binary Search tree? Construct a Binary Search tree for the following data in sequence 77,33,44,11,22,55,66. Write its equivalent in-order traversal. **(7)**

b) What kind of the Binary Search Tree is created in section (i)? Is there any associated problem with such kind of Binary Search Tree? If yes, provide the detail solution. **(8)**

UNIT-IV

Q8 a) What is minimum spanning tree? Find the minimum spanning tree for the given graph using Prim's algorithm. **(7)**



b) Explain the following collision resolution method with the help of example: **(8)**

a) Linear Probing
b) Double hashing
c) Quadratic probing
d) Chaining

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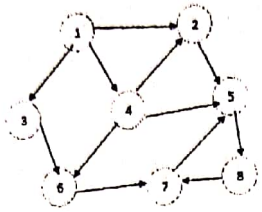
AIM & IIOT/AIDS-201
P-2/2

OR

Q 9 a) Write an algorithm for Depth First Search. Traverse the given graph using DFS. Assume vertex 1 as starting vertex. **(6)**



b) Explain briefly about the following file organization: **(9)**

a) Sequential access file organization
b) Direct access file organization
c) Indexed Sequential access file organization

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