

[4]

Q.6	Attempt any two:					
i.	Write a short note on: (a) Extended Binary Tree (b) Complete Binary Tree	5	02	02	02	02
ii.	Define graphs. Explain graph traversals with illustrative example.	5	02	02	02	02
iii.	The following sequence gives the pre-order and in-order of the binary tree T: Pre-order: A B D G C E H I F In-order: D G B A H E I C F Draw the diagram of the tree.	5	03	02	02	02

Total No. of Questions: 6

Total No. of Printed Pages:4

Enrollment No.....



Faculty of Engineering
End Sem Examination Dec 2024
IT3CO38 Data Structures

Programme: B.Tech.

Branch/Specialisation: IT

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

		Marks	BL	PO	CO	PSO
Q.1 i.	What happens when the code shown below is executed? int main() { printf("Hello"); main(); return 0; }	1	02	02	02	02
	(a) Hello is printed once (b) Hello infinite number of times (c) Hello is not printed at all (d) 0 is returned					
ii.	If the address of Arr[1,1] and [2,1] are 1000 and 1010 respectively in a array Arr[5][5],and each element occupies 2 bytes, the array is stored in- (a) Random (b) Column major (c) Compiler dependent (d) Row major	1	03	02	02	02
iii.	How many internal pointer updates when we insert a node at last position in singly link list- (a) One (b) Two (c) Three (d) None of these	1	01	02	02	02
iv.	In a singly linked list if struct node *temp = start->link then temp will contain- (a) Address of first node (b) Address of start pointer (c) Address of second node (d) None of these	1	02	02	02	02

P.T.O.

[2]

v.	What will be the correct output for the following sequence of operations? push(1), push(2), pop, push(2), push(3), pop, pop, pop, push(5), pop (a) 5 1 2 3 2 (b) 2 1 3 2 5 (c) 2 3 2 1 5 (d) 5 3 2 2 1	1	03	02	02	02
vi.	If 5 6 7 8 are the content of a queue with front=0 and rear=3. What will be the queue content after following operations: Insert (4), Delete (), Delete (), Delete (), Insert (9), Insert (1), Delete () (a) 8 9 1 2 (b) 4 9 1 (c) 5 6 7 (d) 8 9 1	1	03	02	02	02
vii.	Which of the following is not true for binary search algorithm? (a) It divides the array in sub arrays (b) It compares each element (c) Array must be sorted (d) It has time complexity O (log n)	1	01	02	02	02
viii.	For the list of numbers [170, 45, 75, 90, 802, 24, 2, 66], how many passes are required to completely sort it using Radix Sort? (a) 1 (b) 3 (c) 4 (d) 2	1	03	02	02	02
ix.	In the _____ traversal we process all of a vertex's descendants before we move to an adjacent vertex. (a) Depth-First (b) Breadth-First (c) With-First (d) Depth Limited	1	02	02	02	02
x.	After an insertion in an AVL tree, rebalancing might require: (a) Only one rotation (b) At most two rotations (c) At most three rotations (d) At most four rotations	1	01	02	02	02
Q.2 i.	Define data structure and write its types.	2	01	02	02	02
ii.	Explain the different operations to be performed on data structures.	3	02	02	02	02

[3]

iii.	A 2-D array A[4....7, -1....3] requires 2 bytes of storage space for each element. If the array is stored in row-major & column-major order from having base address 100, then find the address of A[6,2].	5	03	02	02	02
OR iv.	Explain: (a) Pointer with types (b) Recursion with suitable example	5	02	02	02	02
Q.3 i.	Discuss why Linked List is better than an array.	4	02	02	02	02
ii.	Write an algorithm to delete a node from the beginning of the singly linked list.	6	03	02	02	02
OR iii.	Write an algorithm to implement insertion operation in a circular linked list.	6	03	02	02	02
Q.4 i.	Explain queue data structure and write down the algorithm of enqueue operation in queue.	4	02	02	02	02
ii.	Use tabular method of stack and convert the following expression from Infix to Prefix and Postfix notation: $R/D-Y*(G/C*(D-E)+B/Z)+S*A$	6	03	02	02	02
OR iii.	(a) Evaluate the following postfix expression using stack- $5\ 2\ 3+-20\ 5\ 3-/*$ (b) Evaluate the following prefix expression using stack- $/-*3\ 5\ 15\ 5$	6	03	02	02	02
Q.5 i.	Explain different searching techniques with example.	3	02	02	02	02
ii.	Write an algorithm for Quick sort. Rearrange the following numbers using Quick sort: 29, 6, 3, 7, 17, 26, 56, 32, 72	7	03	02	02	02
OR iii.	Write an algorithm for Selection sort. Also sort the following array with Selection sort: 170, 45, 75, 90, 802, 24, 2, 66	7	03	02	02	02

Marking Scheme

IT3CO38 (T) Data Structures (T)

IT3CO38 (T) Data Structures (T)				
Q.1	i)	What happens when the code shown below is executed? int main() { printf("Hello"); main(); return 0; } (b) Hello infinite number of times	1	
	ii)	If the address of Arr[1,1] and [2,1] are 1000 and 1010 respectively in a array Arr[5][5],and each element occupie 2 bytes, the array is stored in (d) Row major	1	
	iii)	How many internal pointer updates when we insert a node at last position in singly link list. (b) two	1	
	iv)	In a singly linked list if struct node *temp = start->link then temp will contain (c) Address of second node	1	
	v)	What will be the correct output for the following sequence of operations push(1), push(2), pop, push(2), push(3), pop, pop, pop, push(5), pop c) 2 3 2 1 5	1	
	vi)	If 5 6 7 8 are the content of a queue with front=0 and rear=3. What will be the queue content after following operations: Insert (4), Delete (), Delete (), Delete (), Insert (9), Insert (1), Delete () (b) 4 9 1	1	
	vii)	Which of the following is not true for binary search algorithm? (b) It compares each element	1	
	viii)	For the list of numbers [170, 45, 75, 90, 802, 24, 2, 66], how many passes are required to completely sort it using Radix Sort? (b) 3	1	
	ix)	In the traversal we process all of a vertex's descendants before we move to an adjacent vertex. (a) Depth-First	1	
	x)	After an insertion in an AVL tree, rebalancing might require: (b) At most two rotations	1	
Q.2	i.	Define data structure and write its types. data structure 1 Mark types 1 Mark		2
	ii.	Explain the different operations to be performed on data structures. Three operations 3 Marks		3
	iii.	A 2-D array A[4....7, -1....3] requires 2 bytes of storage space for each element. If the array is stored in row-major & column-major order from having base address 100, then find the address of A[6,2]. Address of A[6, 2] in Row-Major Order: 126 2.5 Marks Address of A[6, 2] in Column-Major Order: 128 2.5 Marks		5
OR	iv.	Explain: 1. Pointer with types 2.5 Marks 2. Recursion with suitable example 2.5 Marks		5
Q.3	i.	Discuss why Linked List is better than an array? 4 Difference 4 Marks		4
	ii.	Write an algorithm to delete a node from the beginning of the singly linked list. Algorithm 6 Marks		6
OR	iii.	Write an algorithm to implement insertion operation in a circular linked list. Algorithm 6 Marks		6
Q.4	i.	Explain queue data structure and write down the algorithm of enqueue operation in queue. queue data structure 1.5 Marks algorithm of enqueue 2.5 Marks		4
	ii.	Use tabular method of stack and convert the following expression from Infix to Prefix and Postfix notation: R/D-Y*(G/C*(D-E)+B/Z)+S*A Postfix: R D / Y G C / D E - * B Z / + S A * + 3 Marks Prefix: + - / R D * Y + * / G C - D E / B Z * S A 3 Marks		6

[2]

[3]

OR iii. a) Evaluate the following postfix expression using stack. **6**

5 2 3+-20 5 3-/*

b) Evaluate the following prefix expression using stack.

/-*3 5 15 5

Postfix Expression Result: 0 3 Marks

Prefix Expression Result: 0.0694 3 Marks

Q.5 i. Explain different searching techniques with example **3**
3 searching techniques 3 Marks

ii. Write an algorithm for Quick sort. Rearrange the following **7**
numbers using Quick sort: 29, 6, 3, 7, 17, 26, 56, 32, 72

Algorithm 3 Marks

Sorting of numbers 4 Marks

OR iii. Write an algorithm for Selection sort. Also sort the following **7**
array with Selection sort: 170, 45, 75, 90, 802, 24, 2, 66

Algorithm 3 Marks

Sorting of numbers 4 Marks

Q.6 Attempt any two:

i. Write a short note on: **5**

(a) Extended B.T. 2.5 Marks

(b) Complete B.T. 2.5 Marks

ii. Define Graphs. **5**

Explain graph traversals with illustrative example. 3 Marks

iii. The following sequence gives the pre-order and in-order of the **5**
binary tree T:

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

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

Draw the diagram of the tree. 5 Marks
