GURU NANAK INSTITUTE OF TECHNOLOGY

An Autonomous Institute under MAKAUT

2022

DATA STRUCTURE AND ALGORITHM

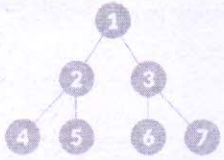
IT304

TIME ALLOTTED: 3Hours **FULL MARKS:70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)

Answer any *ten* from the following, choosing the correct alternative of each question: **10×1=10**

			Marks	CO No
1.	i)	Linked List is a a) Linear data structure b) Dynamic data structure c) Self referential data structure d) All of these	1	CO3
	ii)	For the tree below, write the post-order traversal  a) 4, 5, 2, 6, 7, 3, 1 b) 2, 3, 4, 5, 6, 7, 1 c) 4, 5, 6, 7, 2, 3, 1 d) 1, 2, 3, 4, 5, 6, 7	1	CO5
	iii)	The worst case complexity of binary search for a list having a n elements is a) $\log 2^n$ b) $n \log 2^n$ c) n d) d) n^2	1	CO3
	iv)	If the elements '1', '2', '3' and '4' are added in a stack, so what would be the order for the removal? a) 1234 b) 2134 c) 4321 d) d) None of the above	1	CO2
	v)	Which of the following statements for a simple graph is correct? a) Every path is a trail b) Every trail is a path c) Every trail is a path as well as every path is a trail d) Path and trail have no relation	1	CO2

vi) If there's no base criteria in a recursive program, the program will — 1 — CO3
a) not be executed
b) execute until all conditions match
c) execute infinitely
d) obtain progressive approach

vii) Using division method, in a given hash table of size 157, the key of value 172 be placed at position — 1 — CO2
a) 7
b) 15
c) 72
d) 57

viii) What is the postfix form of the following prefix *+ab–cd — 1 — CO4
a) ab+cd–*
b) abc+*–
c) ab+*cd–
d) none of these

ix) Consider the following operation performed on a stack of size 5. Push(1); Pop(); Push(2); Push(3); Pop(); Push(4); Pop(); Pop(); Push(5); Pop(); After the completion of all operation, the number of elements present in stack are — 1 — CO3
a) 1
b) 2
c) 3
d) 4

x) Any node is the path from the root to the node is called — 1 — CO3
a) Successor Node
b) Ancestor node
c) Internal node
d) None of the above

xi) The minimum number of stacks required to implement a queue is — 1 — CO2
a) 1
b) 2
c) 3
d) 4

xii) Time complexity of quick Sort in average case is — 1 — CO4
a) (n^2)
b) (n log n)
c) (log n)
d) None of these

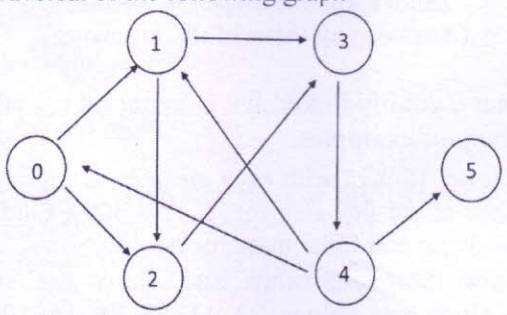
GROUP – B
(Short Answer Type Questions)
(Answer any three of the following) 3 x 5 = 15

		Marks	CO No
2.	Why do you think that a doubly linked list is better than a single linked list, justify with the help of examples.	5	CO3
3.	In a two-dimensional array 18 X15 with each element occupying 4 bytes of memory with the address of the first element [1, 1] is 5000. Find the address of [10, 8] for both Row-major and Column-major cases.	5	CO2
4.	Simulate the Insertion Sort algorithm and show the step-by-step procedure to sort the given data values: 23, 11, 37, 28, 15, 19, 55, 9.	5	CO2
5.	Explain Kruskal's Algorithm with example.	5	CO2
6.	Write an algorithm to delete the element in the circular queue.	5	CO3

GROUP – C
(Long Answer Type Questions)
(Answer any three of the following) 3 x 15 = 45

			Marks	CO No
7.	a)	If N_0 be the total number of leaf nodes and n_2 be the total number of nodes having two children in a binary tree, then prove that $N_2 = N_0 - 1$.	3	CO4
	b)	The in-order and post-order traversal sequence of nodes in a binary tree are given below In-order: G D H B E I A C J F K Post-order: G H D I E B J K F C A Construct the tree showing all the steps.	8	CO3
	c)	Write down the algorithm of push operation of stack.	4	CO2
8.	a)	What do you mean by hashing?	5	CO1
	b)	What is collision? Explain different collision resolution techniques with examples	5	CO2
	c)	Explain Primary clustering and Secondary clustering problem and give a useful solution.	5	CO2
9.	a)	Sort the following data using Quick Sort technique (Show intermediate results) : 65, 70, 75, 80, 85, 60, 55, 50, 45	7	CO3
	b)	Explain hash function.	5	CO1
	c)	Draw the binary expression tree that represents the following postfix expression: A B + CD * +	3	CO2

10.	a)	Implement DFS traversal of the following graph	7	CO5



	b)	Construct AVL tree from the following graph: 29, 33, 35, 37, 32, 34, 26, 20, 19, 15 Show every step. Delete node 29 and 32 from the above constructed tree	8	CO5
11.		Write short note: (any three)	3x5=15	
	a)	B Tree	5	CO3
	b)	BFS	5	CO3
	c)	Adjacency Matrix	5	CO3
	d)	Selection sort	5	CO5