GURU NANAK INSTITUTE OF TECHNOLOGY

An Autonomous Institute under MAKAUT

2022

DATA STRUCTURE AND ALGORITHM

FT605A

TIME ALLOTTED: 3 HOURS **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)	Which data structure is used for implementing recursion? a) Queue b) Stack c) Array d) List	1	CO3
	ii)	A vertex of degree one is called a) Isolated vertex b) Pendant vertex c) Colored vertex d) Null vertex	1	CO2
	iii)	Which data structure is used for implementing recursion? a) Queue b) Stack c) Array d) List	1	CO2
	iv)	No of edges in a complete connected graph is a) 2n+2 b) 2^n - 2 c) n^2 -2 d) n(n-1)/2	1	CO4
	v)	Which data structure is used for implementing recursion? a) Queue b) Stack c) Array d) List	1	CO5
	vi)	What is the value of the postfix expression 6 3 2 4 + – *: a) Something between -5 and -15 b) Something between 5 and -5 c) Something between 5 and 15 d) Something between 15 and 100	1	CO2

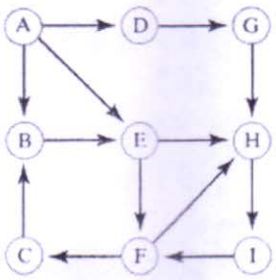
vii)	The situation when in a linked list START=NULL is a) Underflow b) Overflow c) Saturated d) Houseful	1	CO2
viii)	The initial configuration of a queue is a, b, c, d, ('a' is in the front end). To get the configuration d, c, b, a, one needs a minimum of a) 2 deletions and 3 additions b) 3 deletions and 2 additions c) 3 deletions and 3 additions d) 3 deletions and 4 additions	1	CO2
ix)	A binary tree is balanced if the difference between left and right sub-tree of every node is not more than ____ a) 1 b) 3 c) 2 d) 0	1	CO2
x)	In which data structure memory is contiguous a) Array b) Link list c) Both d) None	1	CO1
xi)	The prefix form of A-B/ (C * D ∧ E) is? a) -/*∧ACBDE b) -ABCD*∧DE c) -A/B*C∧DE d) -A/BC*∧DE	1	CO3
xii)	Evaluate the postfix expression 3574-2^*+ a) 41 b) 45 c) 48 d) None of the above	1	CO3

GROUP – B
(Short Answer Type Questions)

Answer any ***three*** from the following: **3×5=15**

		Marks	CO No
2.	In a two-dimensional array 14X12 with each element occupying 2 bytes of memory with the address of the first element [1, 1] is 2500.Find the address of [8, 5] for both Row-major and Column-major cases.	5	CO3
3.	Convert the following infix expression into equivalent postfix expression using stack. [A + (B * C) + (D / E)] /F – G * H	5	CO2

4. Implement BFS traversal of the following graph — 5 — CO3



5. Write an algorithm or function to insert one node at end of the linked list. — 5 — CO4

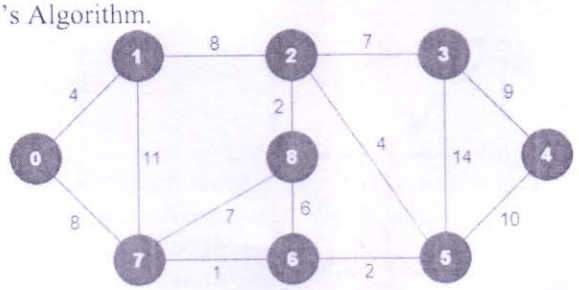
6. Write an algorithm to PUSH the element in a stack. What is Input restricted De-queue. — 5 — CO2

GROUP – C
(Long Answer Type Questions)

Answer any ***three*** from the following: **3×15=45**

			Marks	CO No.
7.	a)	Write down the algorithm of Merge sort.	8	CO4
	b)	Write a C program to implement Binary search.	7	CO4
8.	a)	The in-order and post-order traversal sequence of nodes in a binary tree are given below In-order: - P E L M Q R N I H Post-order:- E M L P R I H N Q Construct the tree	8	CO3
	c)	Construct a AVL tree from the given data: 13, 14, 11, 10, 8, 5, 2, 16, 19, 22, 18	7	CO3
9.	a)	Evaluate the expression-using prefix. (12*5+6) / 6 - (5+6/3) * 6 + 8 / 4	7	CO1
	b)	Write an algorithm/function to insert the element in Circular Queue.	5	CO2
	c)	If N_0 be the total no of leaf nodes and N_2 be the no of nodes having two children in a binary tree, then prove that: $N_2 = N_0 - 1$.	3	CO2
10.	a)	Show each step to construct a min heap from the following numbers in the order in which they are given: 30, 60, 12, 26, 71, 31, 18, 38, 35, 7, 29, 3. Delete 12 and 7 form the tree.	7	CO1
	b)	Show the stages in growth of 5 order B-tree when the following keys are inserted in the given order: 17, 21, 23, 43, 13, 31, 32, 19, 11, 35, 37, 40, 14, 25, 28, 41, 22	8	CO1

11. a) Find out the minimum spanning tree in the given graph by Kruskal's Algorithm. 8 CO1



b) Built a weight balanced tree from the followings: 7 CO5

W1	W2	W3	W4	W5	W6	W7	W8	W9
5	10	7	4	6	7	9	11	16