Mahindra University
Global Thinkers Engaged Leaders

Mahindra University Hyderabad
École Centrale School of Engineering
End Semester

Program: B. Tech. Branch: CSE+AI+ECM+CM Year: I Semester: II
Subject: Data Structures and Algorithms (CS1203)

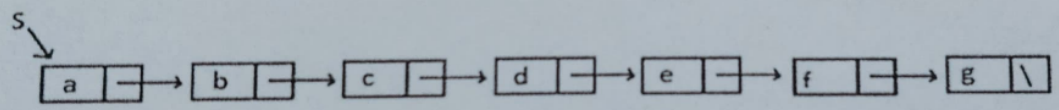
Date: 30/05/2024 **Start Time: 10:00 am**
Time Duration: 3 Hours **Max. Marks: 100**

Instructions:
1) All questions are compulsory.
2) Try to solve questions in sequence.

Q.1 [Marks: 5+5] An array A [0…34][0…13] is stored in column major order and each element is occupying 8 bytes of memory. If the location A [5][10] is stored at the address 4000, find out following: (a) Base Address. (b) Address of location A [2][5]

Q.2 [Marks: 5+5]
Write a c program which performs the following task.
(a) Create a linked list of size n.
(b) Prints it's all odd positioned node values. (use linked list created in (a))
Try to make separate functions for both, however another way (including both inside main ()) is also fine.

Q.3 [Marks: 10] Consider the below given linked list:



Follow the following steps and find the final output after performing all the steps on the given linked list:

1. Struct node *P;
2. P = S → next → next → next;
3. P → next → next → next → next = S → next → next;
4. S → next → next = P → next → next → next;
5. Print(P → next → next → next → next → next → next → next→ data)

Q.4 [Marks: 5+5] (a) Find postfix for following expression: A + B * (C + D) / F + D * E
(b) Let you have 4 values a,b,c,d in sequences for stack input, write any 10 valid output sequence.

Q.5 [Marks: 10] Explain the asymptotic notations (Big-oh, Big-theta, and Big-Omega) with diagrams.

Q.6 [Marks: 5+5] Write pseudocode/algorithm of selection sort also explain working of it step by step using following numbers.

23,14 5,12,6,28,32

Q.7 [Marks: 5+2.5+2.5]

(a) Draw binary tree using following traversal.

Converse pre order: A C G J F B E I D

Converse in-order: J G C F A E I B D

(b) Total 5 nodes are available then how many unique tree structures are possible by using **all nodes** in following cases. (Don't count tree of 1 node, 2 nodes, 3 nodes, and 4 nodes)

(a) All nodes are unlabeled.

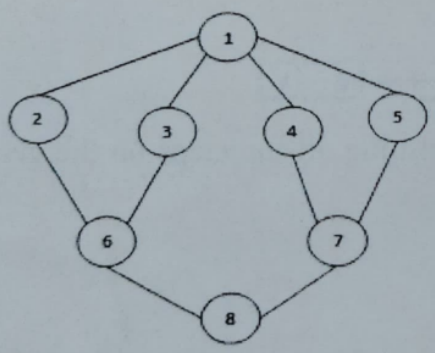
(b) All nodes are distinctly labeled.

Q.8 [Marks: 10]

Make step by step an AVL tree for date given as: 35, 50, 40, 25, 30, 60, 78, 20, 28

Q.9 [Marks: 10] You have data 15, 11, 25, 33, 16, 43, 29 and the hash table size is 10. Using linear probing technique, insert the above data into the table, use module division as a hash function. Find the number of probe numbers for each data. Consider 11 as a prime number hash function.

Q.10 [Marks: 10] For the given graph, following Breadth First Search (BFS) and Depth First Search (DFS) sequences are given, please check the sequence and write correct or incorrect corresponding to each sequence.



Seq. No.	Breadth First Search (BFS)	Depth First Search (DFS)
1)	8, 6, 7, 2, 3, 1, 4, 5	1, 2, 3, 6, 8, 7, 4, 5
2)	1, 2, 3, 4, 5, 8, 6, 7	8, 6, 7, 2, 3, 4, 5, 1
3)	2, 1, 6, 3, 4, 5, ,7, 8	8, 7, 4, 1, 2, 6, 3, 5
4)	1, 2, 3, 4, 5, 6, 8, 7	3, 6 ,8, 7, 4, 1, 5, 2
5)	7, 4, 5, 8, 1, 3, 2, 6	5, 1, 3, 2, 6, 7, 8, 4