Question Paper

Exam Date & Time: 05-Mar-2021 (09:00 AM - 12:00 PM)

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

THIRD SEMESTER B.TECH END SEMESTER EXAMINATIONS, MARCH 2021

DATA STRUCTURES [ICT 2153]

Marks: 50 **Duration: 180 mins.**

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1)		Write a complete C++ program to perform the following:	(5)
	A)	i. Read a polynomial and represent it in Circular Singly Linked List (CSLL) form. ii. Multiply two polynomials represented using CSLL.	
	B)	Given two integers M, N and a Circular Singly linked list, write a user defined function, void skipMdeleteN(NODE *First, int M, int N), which traverses the linked list and retains M nodes and then deletes next N nodes. The same procedure is continued till the end of the list. First refers to the starting node's address of the list. Example Input: M = 2, N = 2 Linked List: 1->2->3->4->5->6->7->8 Output: Linked List: 1->2->5->6.	(3)
	C)	Explain tabular method for computing step count with a suitable example in performance analysis of algorithms.	(2)
2)		Write a user defined function in C++ that takes two sparse matrices A and B as input	(5)
	A)	represented in < row, column, value> format and displays C which is the result of addition of A and B in < row, column, value> format. Also, display C in 2D matrix format.	
	B)	Write user defined functions to perform the following: i) To create a Binary tree ii) To create a binary search tree	(3)
	C)	Any n-ary tree can be represented as a Binary Tree. Justify this statement with a suitable example.	(2)
3)		Write a complete C++ program to convert a given postfix expression into prefix expression. Trace the program with each step of conversion for the following expression: ABC/-AK/L-*	(5)
	A)		
	B)	Write a complete program to perform Depth First Search, and trace the same for the graph given in Figure Q8.considering node 1 as start node.	(3)

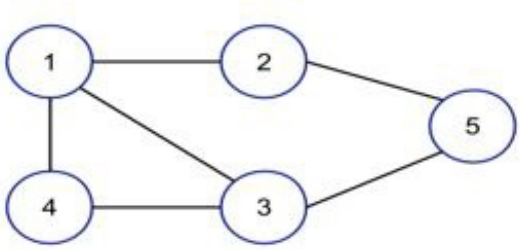

Figure Q8.

C) Write a complete C++ program to check if a given string is palindrome or not, using stacks. Use class concept. (2)

4) Write a complete program to perform descending order heap sort. Trace the same for the max heap shown in the Figure Q10. (5)

A)

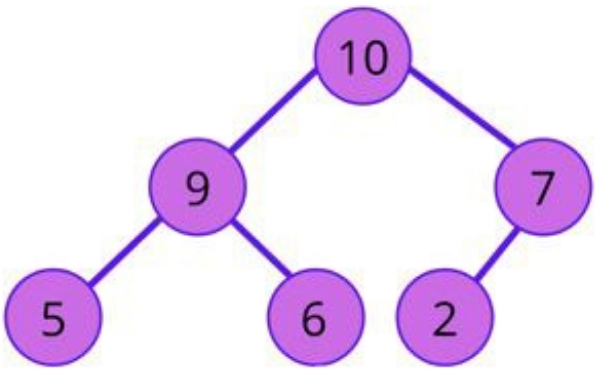

Figure Q10.

B) Construct an expression tree for the given expression A + B - C * D / E + F + G * H. Show each step of construction. (3)

C) Write a recursive user defined function to perform binary search on an array of elements (2)

5) Define a class student. It defines the name, registration number, marks of 5 subjects, total marks and percentage of marks. Write a function to read N student details. Also write a recursive user defined function to sort the student list in the descending order of percentage. Invoke the read and sort function from main( ) method. (5)

A)

B) Explain each of the following with a proper example: (3)

i. Strictly Binary Tree

ii. Complete Binary Tree

iii. Full Binary Tree

C) Explain different types of constructors with suitable examples. (2)

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