# **Question Paper**

Exam Date & Time: 03-May-2019 (02:00 PM - 05:00 PM)



## MANIPAL ACADEMY OF HIGHER EDUCATION

### INTERNATIONAL CENTRE FOR APPLIED SCIENES II SEMESTER B.Sc.(Applied Sciences) IN ENGINEERING END SEMESTER THEORY EXAMINATION-APRIL/MAY 2019

Data Structures [CS 123]

Marks: 100

### Duration: 180 mins.

### Answer ANY FIVE FULL Questions Missing data may be suitably assumed.

- What is space and time complexity? Explain. Calculate the time complexity <sup>(10)</sup> for the following function using step count table and represent using Big-oh
   A) notation
  - <sup>A)</sup> notation.

void funct(int m, int n)

- { int i,j; for (i=0;i< m;i++) for (j=0;j< n;j++) cout< < i\*j; }
- B) What is a recursive function? Give the properties of the same. Give a (10) comparison of recursive and iterative algorithms.
- <sup>2)</sup> Give the algorithm for evaluation of Postfix Expression using Stack. Show (10) the steps in evaluating the expression: ABC\*D/+EF\*-
  - B) Give the algorithm for converting an Infix expression to postfix using stack. <sup>(10)</sup>
    Show the working of the algorithm by considering the expression A \* (B + C)
    \* D, showing the stack contents and output after each token.
- What is an inline function? How do you make a function inline? Explain with <sup>(10)</sup> syntax and example. What are advantages and disadvantages of inline function over normal functions?
- <sup>B)</sup> Implement the Insert, Delete and Display functions of a linear queue. <sup>(10)</sup>
- <sup>4)</sup> Give the algorithms for insertion and deletion into a Circular Queue. <sup>(10)</sup>
  - A)
  - B) Write the algorithm/functions to implement the following operations on a (10) singly linked list:
    i) InsertFront(int x)
    - ii) DeleteFront()
- <sup>5)</sup> What is an expression tree? Write a function to create a binary tree for the <sup>(10)</sup>

- A) given postfix expression.
- B) (10) What is the advantage of doubly linked list over singly linked list? Give the functions for the following operations on doubly linked list: i) InsertLast(int x) ii) Delete(int x) 6) (10) With an example for each, explain the following terms: i) Strictly Binary tree A) ii) Binary Search tree iii) Level of a tree iv) Almost Complete binary tree v) Indegree of node B) (10)Write a function to display the elements of a binary tree using level order traversal. Explain the algorithm with help of an example. 7) Construct a Binary search tree for the list of alphabets given below by taking <sup>(10)</sup> the first element as root: A) J, R, D, G, T, E, M, H, P, A, F, Q Also write down the output of inorder and preorder traversal for the above tree. B) Give the function for Quick Sort algorithm. Also mention the time complexity <sup>(10)</sup> of Ouick Sort. Trace the function for the following input values:
  - 45, 26, 27, 70, 14, 90
- What are different ways of representing a graph? Explain with an example (10) for each.
  - <sup>B)</sup> Explain with an example, the different storage representations for a binary <sup>(10)</sup> tree.

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