Reg. No. ☐☐☐☐☐☐☐

I Semester M.C.A. Degree Examination, July- 2022
COMPUTER SCIENCE
Data Structures
(CBCS Scheme)
Paper: 1MCA6

Time : 3 Hours   Maximum Marks : 70

Instructions to Candidates: 1)   Part A: Answer any **Five** questions.
                                 2)   Part B: Answer any **Four** questions.

PART - A

A.   Answer any **Five**. Each question carries **Six** marks.   (5×6=30)

1.   Define Asymptotic Notations. Explain its utility in analysis of an algorithm.

2.   Describe briefly three types of structures used for storing Strings.

3.   Explain linked list. Write an algorithm to count the number of nodes in a singly linked list.

4.   Write the algorithm for push and pop stack operation. The following sequence of operations is performed on a stack: push (1), push(2), pop(), push (1), push (2), pop(), pop(), pop(), push (2), pop (). Determine the sequence of popped out values.

5.   Define hashing, hash function and collision. Differentiate between static and dynamic hashing.

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6. Write short notes on any **two** of the following:

    a) Topological sorting of a directed graph.

    b) Sparse Matrix.

    c) Lexicographic Search Trees.

7. Write a recursive algorithm to solve factorial of a number.

8. Traverse the given tree using inorder, preorder and postorder traversal.
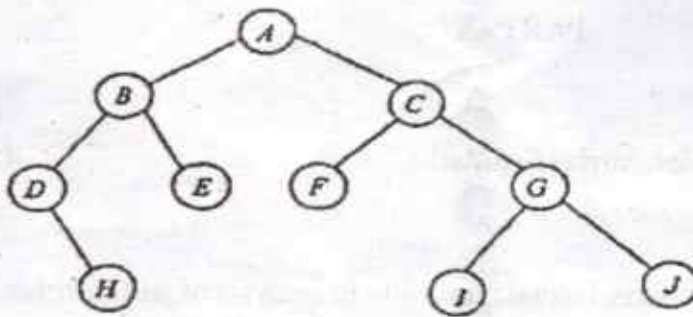
PART - B

B. Answer any **Four**. Each question carries Ten marks.   (4×10=40)

  9. a) Calculate the number of comparisons required to match the given pattern using Naïve string-matching algorithm.

     b) Analyse how the efficiency is increased by the pre-computed tables in Boyer Moore algorithm with the following example.   (5+5)

    Text: G C A A T G C C T A T G T G A C C

    Pattern: T A T G TG

10. a) Describe the steps to convert infix to postfix expression.

   b) Show the detailed contents of stack to convert the given infix expression ((A+B)^C)-((D*C)/F)to postfix expression. Evaluate it for the given values A=6, B=3, C=2, D=4, F=2. Priorities are of the order C, ∧, * & γ, + & - (5+5)

11. a) Write an algorithm to insert a NEWNODE at the beginning of a singly linked list and delete a node at the end of a singly linked list.

   b) Differentiate between circular queue and doubly ended queue. Calculate the minimum number of queues required to implement a priority queue. (5+5)

12. a) Show the Binary Search Tree that is obtained after inserting the key 8, 11, 5, 7, 9, 6, 10, 14, 12. Redraw the tree after deleting the Root.

   b) Apply Breadth first Search (BFS) on the following graph. (5+5)
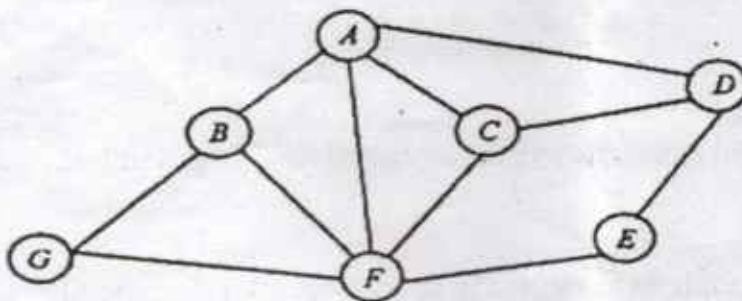
13. a) Illustrate the working of Heap sort algorithm on the following input: 35, 15, 0, 1, 60

   b) Build an AVL tree with the following values: 15, 20, 24, 10, 13, 7, 30, 36, 25, 42, 29. (5+5)

14. a) Show the tracing of the following list of numbers writing a merge sort algorithm. 8, 2, 4, 6, 9, 7, 10, 1, 5, 3.

   b) Explain the Binary Search technique using an algorithm. Search 5 in the list. {1, 2, 4, 5, 9, 18, 21} (5+5)