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MCS–021

MASTER OF COMPUTER APPLICATIONS /BACHELOR OF COMPUTER APPLICATIONS (REVISED) (MCA/BCA)

Term-End Examination

December, 2025

MCS-021 : DATA AND FILE STRUCTURES

Time : 3 Hours *Maximum Marks : 100*

Weightage : 75%

Note : *(i) Question No.* ***1*** *is compulsory.*

(ii) Attempt any ***three*** *questions from the rest.*

(iii) All algorithms should be written near to 'C' language.

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1. (a) Justify the statement that for two functions $f(n)$ and $g(n)$ such that : 8

$$f(n) = n^2 + 3x + y \text{ and } g(n) = n^2$$

Then $f(n) = O(g(n))$, where O : Big-O notation.

(b) Write an algorithm for the following :

(i) Insect an element at random position in a linked list. 5

(ii) Delete an element from the beginning of a linked list. 5

(c) What is stack ? Explain how the stack can be implemented using arrays. 10

(d) Write and explain Prim's algorithm for finding minimum cost spanning tree. Explain the algorithm in terms of complexity. 12

2. (a) Write an algorithm for merge sort. Write step-by-step working of this algorithm for sorting the following set of data : 10

7, 13, 25, 6, 14, 28, 2, 35

(b) What is AA trees ? Explain how AA trees differs from Red-Black tree. 10

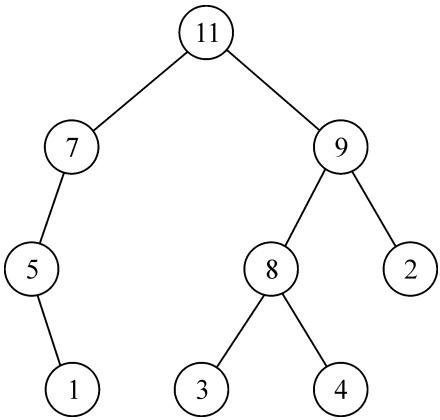
3. (a) Write a program in 'C' language to store the following polynomial function :

$$f(x) = ax^2 + bx + c,$$

where a, b and c are constants. 10

(b) What is a linear search ? Explain whether linear search is more efficient than binary search. Justify your answer with an suitable example. 10

4. (a) Traverse the following Binary tree pre-order and post-order : 10



(b) What is an AVL tree ? Explain insertion of nodes into AVL with the help of a suitable example. 10

5. (a) Explain Breadth First Search (BFS) for a graph using example. 10

   (b) What is a circular linked list ? Write a algorithm to create a circular linked list and delete an element from it. 10

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