Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 81155

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2025.

Third Semester

Computer Science and Engineering

CS 3301 – DATA STRUCTURES

(Common to : Electrical and Computer Engineering)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

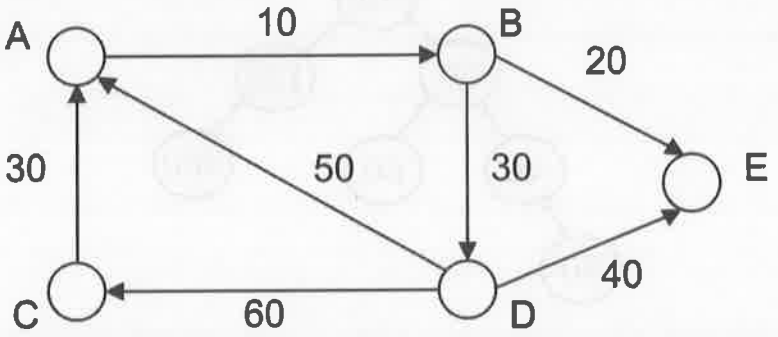
Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish between static data structure and dynamic data structure.
2. Write the linked list representation of a polynomial:

   $p(x) = 4x^3 + 6x^2 + 7x + 9$.
3. Write the algorithm to find the value of i^{th} element from the top of the stack.
4. Given the prefix for an expression. Write its postfix.

   _*_+abc/ef-g/hi.
5. Define a complete binary tree.
6. Define balance factor of AVL Tree.
7. List the difference between B tree B+ tree.
8. Represent the following graph using Adjacency matrix and adjacency list.



9. Give two examples of linear search.

10. Define hash function.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Write the algorithm to print the alternative values of singly linked list. (7)

(ii) Write the pseudo code for insertion operation of doubly linked list. (6)

Or

(b) Explain how polynomials can be represented as a linked list. Outline the algorithm for adding of two polynomial using linked list with example.

12. (a) (i) Explain how to evaluate arithmetic expressions using stacks. (7)

(ii) Describe how the following "infix" expression is evaluated with the help of stack : 5*(6+2)-12/4. (6)

Or

(b) Illustrate the enqueue and dequeue operations on double ended queues.

13. (a) (i) Construct an expression tree for the expression (a+b*c) + ((d*e+f)*g). Give the outputs when you apply inorder, preorder and postorder traversals. (7)

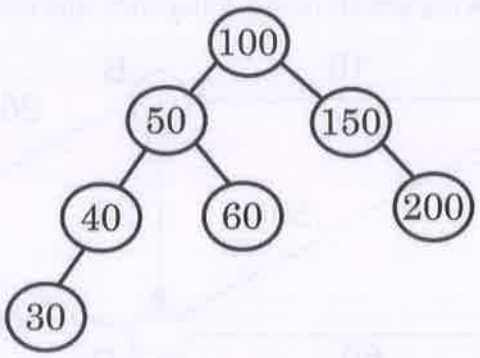
(ii) Explain in detail about priority queue ADT in detail. (6)

Or

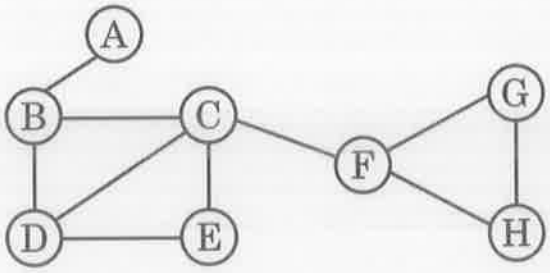
(b) Given the AVL tree below, show the AVL tree that would result.

(i) After inserting the key of value 10. (7)

(ii) After deleting the key of value 50 (6)



14. (a) (i) For the given graph, draw the DFS and BFS. (7)



(ii) List and explain the various representation of graph with example in detail. (6)

Or

(b) (i) Illustrate Kruskal's algorithm to find the minimum spanning tree of a graph. (7)

(ii) Write short notes on Bi-connectivity. (6)

15. (a) (i) Write the output of Merge sort after the 4th iteration given the following sequence.

16 3 46 9 28 14 12 36 45 32 (7)

(ii) Explain the rehashing technique with suitable example. (6)

Or

(b) Given the input {8271, 1323, 5173, 4134, 4344, 9679, 1989} and a hash function of h(X)=X (mod 10) show the resulting:

(i) Separate Chaining hash table (6)

(ii) Open addressing hash table using linear probing. (7)

PART C — (1 × 15 = 15 marks)

16. (a) Create a binary search tree for the following numbers start from an empty binary search tree. 45,26,10,60,70,30,40. Delete keys 10,60 and 45 one after the other and show the trees at each stage.

Or

(b) Using Dijkstra's algorithm, find the shortest path from the source node A.