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Question Paper Code : 70070

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Third Semester

Computer Science and Engineering

CS 3301 — DATA STRUCTURES

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Outline a linear and a nonlinear data structure with an example.
2. Outline a circular linked list with a diagram.
3. Convert the infix expression $(a + b) * (c - d)$ to prefix expression.
4. What is a queue data structure?
5. Construct a binary tree for the expression $(a + b) * (c - d)$.
6. What is a heap? Outline the properties of a heap.
7. Outline the difference between a B tree and a B+ tree data structure with respect to storing — keys and records.
8. Outline a directed graph with an example.
9. Outline divide-and conquer algorithm design paradigm.
10. What is a hash function?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Outline the steps to search a linked list with an example and relevant diagrams. (7)
(ii) Outline the steps to delete from a linked list with an example and relevant diagrams. (6)

Or

- (b) How can a polynomial be represented as a linked list? Outline the algorithm for addition of two polynomials using linked lists with an example.
12. (a) Outline the algorithm for evaluating a postfix expression using stack data structure with an example.

Or

- (b) What is a deque? Outline the operations that can be performed on a deque with an algorithm, example and relevant diagrams.
13. (a) Outline preorder, inorder and postorder traversal on a binary tree with an algorithm and an example.

Or

- (b) State the binary search tree property and outline the algorithm to search a binary search tree with an example.
14. (a) Outline breadth first search traversal and depth first search traversal of a graph with an example.

Or

- (b) Outline the steps in the Dijkstra's shortest path algorithm with an example.
15. (a) Outline the algorithm to perform linear search on an array of 'N' numbers. Illustrate each step of the algorithm with an example.

Or

- (b) Outline the algorithm to sort an array of 'N' numbers using bubble sort. Illustrate each step of the algorithm with an example.

PART C — (1 × 15 = 15 marks)

16. (a) Outline the steps in constructing a minimal spanning tree using kruskal's algorithm and apply the algorithm for the weighted undirected graph presented below. [Figure: undirected weighted graph with vertices A to I and edges A-B = 4, A-H = 8, B-C = 8, B-H = 11, C-D = 7, C-I = 2, C-F = 4, D-E = 9, D-F = 14, E-F = 10, F-G = 2, G-H = 1, G-I = 6, H-I = 7]

Or

- (b) Outline the steps in the insertion sort algorithm and apply the algorithm for the numbers given below. 12, 06, 14, 02, 01, 04, 03
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