S.No. : 293 BCS 3403

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Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 33217 Roll No. 1 2 2 0 [redacted]

B. Tech. Examination 2023-24

(Even Semester)

DATA STRUCTURE USING 'C'

Time : Three Hours] *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION–A

1. Attempt all parts of the following : $8 \times 1 = 8$

   (a) Define best case, average case and worst case for analyzing the complexity of a program.

   (b) Write the condition for empty and full circular queue.

   (c) Differentiate between internal sorting and external sorting.

   (d) Write an algorithm for Breadth First Search (BFS) traversal of graph.

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(e) Construct an expression tree for the following algebraic expression :

$$(a - b) / ((c * d) + e)$$

(f) Differentiate between binary search tree and a heap.

(g) Which data structure is used to perform recursion and why?

(h) What is backtracking?

SECTION – B

2. Attempt any two parts of the following : 2×6=12

(a) Assume that the declaration of multi-dimensional arrays X and Y to be :

X (–2 : 2, 2 : 22) and Y (1 : 8, –5 : 5, –10 : 5)

(i) Find the length of each dimension and number of elements in X and Y.

(ii) Find the address of element Y (2, 2, 3), assuming base address of Y = 400 and each element occupies 4 memory locations.

(b) What is stack? Write a program for linked list implementation of stack.

(c) Write an algorithm for quick sort. Use quick sort algorithm to sort the following elements :

2, 8, 7, 1, 3, 5, 6, 4

(d) Write difference between sequential search and binary search with example.

SECTION – C

Note :– Attempt all questions. Attempt any two parts from each questions. 8×5=40

3. (a) What is recursion? Explain recursion processes with example.

(b) How to represent the polynomial using linked list? Write a C program to add two polynomials using linked list.

(c) Discuss doubly linked list. Write an algorithm to insert a node after a given node in singly linked list.

4. (a) Write an algorithm for converting infix expression into postfix expression. Trace your algorithm for infix expression Q into its equivalent postfix expression P :

$$Q : A + (B * C - (D / E \wedge F) * G) * H$$

(b) What is circular queue? Write a C code to insert an element in circular queue.

(c) Discuss about collision resolution strategies.

5. (a) What is Hashing? Explain division method to compute the hash function.

(b) Write an algorithm for heap sort. use heap sort algorithm, sort the following sequence :

18, 25, 45, 34, 36, 51, 43 and 24.

(c) Discuss left skewed and right skewed binary tree. Construct an AVL tree by inserting the following elements in the order of their occurrence :

60, 2, 14, 22, 13.

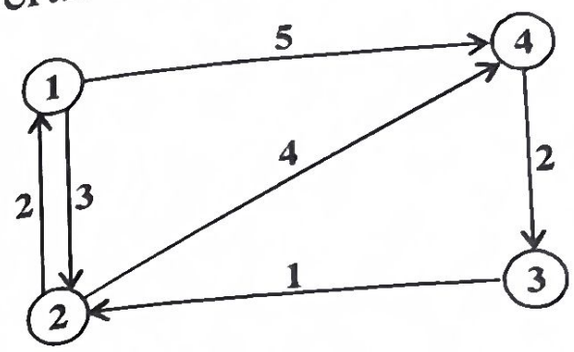
6. (a) What is B-tree? Write the various properties of B-tree. Show result of inserting the keys :

F, S, Q, K, C, L, H, T, V, W, M, R, N, P, A, B

in order into a empty B-tree of order 5.

(b) What is spanning tree? Write down the Prim's algorithm to obtain minimum cost spanning tree.

(c) Write an explain the Floyd Warshall algorithm to find the all pair shortest path. Use the Floyd Warshall algorithm to find shortest path among all the vertices in the given graph :



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