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Reg. No. :

Question Paper Code : 20412

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Third/Sixth/Seventh/Eighth Semester

Computer Science and Engineering

CS 8391 – DATA STRUCTURES

(Common to: Computer and Communication Engineering/Electrical and Electronics Engineering/Electronics and Instrumentation Engineering/Instrumentation and Control Engineering/Information Technology)

(Regulations 2017)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the advantage of ADT.

2. Compare calloc() and realloc() function and mention its application in linked list.

3. Give the postfix and prefix forms of the expression: $A + B* (C — D)/ (P — R)$

4. Write an algorithm for inserting a new element into the stack.

5. How do we calculate the balance factor for each node in an AVL tree?

6. Define a heap and show how it can be used to represent a priority queue.

7. Define the length of the graph.

8. What is Topological sorting? Give its application.

9. Name the applications of linear and binary search techniques

10. Identify the advantage of shell sort over insertion sort.

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PART B — (5 × 13 = 65 marks)

11. (a) Explain the steps involved in the following insertion operations in a Singly linked list.

    (i)   Insert the node in the start and End. (7)

    (ii)   Insert the node in the middle of the List (6)

Or

  (b) Describe the various operations of the list ADT with examples.

12. (a) Explain an algorithm to implement the circular queue using arrays. List the applications of Queues.

Or

  (b) Write an algorithm to convert an infix expression to a postfix expression. Trace the algorithm to convert the infix expression $(a+b)*c/d+e/f$ to a postfix expression.

13. (a) (i) Compare B trees with B+ trees. (5)

    (ii)   Create a B+ tree of order 5 for the following data arriving in sequence: 90, 27, 7, 9, 18, 21, 3, 4, 16, 11, 21, 72. (8)

Or

  (b) What are AVL trees? Describe the different rotations defined for AVL tree.

14. (a) Given the adjacency matrix of a graph, write a program to calculate the in-degree and the out-degree of a node N in the graph.

Or

  (b) Differentiate depth-first search and breadth-first search traversal of a graph with suitable examples.

15. (a) Write an algorithm to sort a set of 'N' numbers using quick sort. Demonstrate the algorithm for the following set of numbers: 88, 11, 22, 44, 66, 99, 32, 67, 54, 10.

Or

  (b) Given input $\{4371,1323,6173,4199,4344,9679,1989\}$ and a hash function $h(x)=x(\bmod 10)$, show the resulting

    (i)   Open hash table (5)

    (ii)   Closed hash table using linear probing (4)
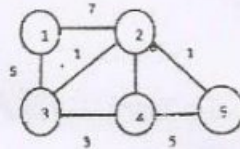
    (iii) Closed hash table using quadratic probing (4)

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PART C — (1 × 15 = 15 marks)

16. (a) Illustrate Kruskal's algorithm to find the minimum spanning tree of a graph. Trace the algorithm for the following graph

Or

(b) Consider the binary search free given below. Find the result of in-order, pre-order, and post-order traversals. Show the deletion of the root node Insert 11, 22, 33, 44, 55, 66, and 77 in the tree

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