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Roll No....

IIIRD SEMESTER

B.Tech.(Computer Engg.)

END SEM. EXAMINATION

(Nov. – 2022)

Paper Code: CO-201

Title of the subject: **Data Structures**

Time: 3:00 Hours

Max. Marks: 40

Note: Answer any five questions. Write pseudo code/C code for all algorithms asked. Use C code for question 7(b). Assume suitable missing data, if any.

1. Two Max-Heaps stored in array A[0..(n_1-1)] and B[0..(n_2-1)] are given. It is required to merge them into single Max-Heap C[0..(n_1+n_2-1)] without destroying/modifying given heaps. Explain at least two methods for this and write down algorithm for most efficient method to perform desired task. [8][CO01]

2. (a) Write an algorithm to check if given tree is a binary search tree or not. [4][CO04]

   (b) Write an algorithm to check if all nodes in this tree satisfy heap property or not. Return true/1 if all nodes satisfy heap property, and return false/0 otherwise. [4][CO01]

3. (a) The following binary tree has the following in-order and pre-order traversal. Draw the tree and give the post-order traversal. Also, write the algorithm for the same.

   In-order ABCEDFJGIH

   Pre-order JCBADEFIGH

   [4][CO04]

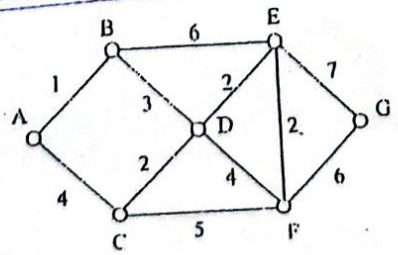
   (b) Write an algorithm to print binary tree nodes in level order traversal (print level wise starting from root node then level 1, level 2 and so on). [4][CO04]

4. (a) Write an algorithm to evaluate a postfix expression containing only four operators (+,-,*,/) where division is floating point division. [5][CO02]

   (b) Convert following infix expression to prefix expression: (a-b)/c+d*e-f/(g*h). [3][CO02]

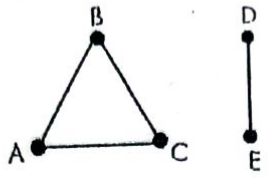
5. (a) Describe concept of bucket and chaining in Hash tables. Compare the performance of two for search operations. [4][CO05]

   (b) For given graph give adjacency matrix and adjacency list representation. Does adjacency list representation of a graph always saves space compared to adjacency matrix representation. Justify your answer.



[4][CO06]

6. A not connected graph may contain several connected components (Example shown in figure: a not connected graph with two connected components). Write an algorithm (using concept of DFS/BFS) to print all (i) number of connected components and (ii) nodes of each connected component in a parenthesis like (A, B, C) (D,E) for given graph.



[8][CO06]

7. (a) Draw a B-Tree of order 6 (max six children for each node, min 2 keys and max 5 keys in a node) by performing insertions in an empty B-Tree in following order: 12, 45, 65, 44, 19, 23, 18, 90, 76, 46, 32, 57, 93, 20, 29, 63. Draw intermediate B-Trees before and after every node split operation. [6][CO06]

(b) Write a recursive function in C to create a copy of a given linked list. [2][CO03]