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CS 131305

24/1/19

Roll No. of candidate

2019

B.Tech. (CSE) 3rd Semester End-Term Examination

DATA STRUCTURE AND ALGORITHMS

(New Regulation)

(W.e.f 2017 - 2018)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer Question No. 1 and any *Four* from the rest.

1. Answer the following Multiple Choice questions : $(10 \times 1 = 10)$

   (i) When new data are to be inserted into a data structure, but there is no available space; this situation is usually called

   (a) underflow (b) overflow

   (c) houseful (d) saturated

   (ii) Which of the following is two way list?

   (a) grounded header list

   (b) circular header list

   (c) linked list with header and trailer nodes

   (d) none of above

[Turn over

(iii) The complexity of the average case of an algorithm is

(a) Much more complicated to analyze than that of worst case

(b) Much more simpler to analyze than that of worst case

(c) Sometimes more complicated and some other times simpler than that of worst case

(d) None or above

(iv) Which of the following is not a limitation of binary search algorithm?

(a) must use a sorted array

(b) requirement of sorted array is expensive when a lot of insertion and deletions are needed

(c) there must be a mechanism to access middle element directly

(d) binary search algorithm is not efficient when the data elements are more than 1000

(v) B Trees are generally

(a) very deep and narrow

(b) very wide and shallow

(c) very deep and very wide

(d) cannot say

(vi) A binary tree in which if all its levels except possibly the last, have the maximum number of nodes and all the nodes at the last level appear as far left as possible, is known as

(a) Full binary tree

(b) AVL tree

(c) Threaded tree

(d) Complete binary tree

(vii) One can convert a binary tree into its mirror image by traversing it in

(a) inorder (b) preorder

(c) postorder (d) any order

(viii) A full binary tree with 2n+1 nodes contain

(a) n leaf nodes

(b) n non-leaf nodes

(c) n–1 leaf nodes

(d) n–1 non-leaf nodes

(ix) A graph with n vertices will definitely have a parallel edge or self-loop of the total number of edges are

(a) more than n

(b) more than n+1

(c) more than (n+1)/2

(d) more than n(n–1)/2

(x) The total number of companions required to merge 4 sorted files containing 15, 3, 9 and 8 records into a single sorted file is

(a) 66 (b) 39

(c) 15 (d) 33

2. (a) Write a program to insert an element at kth position of an array having n elements. (5)

(b) Convert the following infix expressions to postfix, showing he stack after every step.

(i) ((A/B)/C)+D)

(ii) (A*B) + (C–D) (2.5 × 2 = 5)

(c) Write a C program to perform the deletion operation of elements in a queue. The program should display the rear and front after every deletion. (5)

3. (a) Explain about application of linked lists for polynomial manipulation. (5)

(b) What do you understand by adjacency matrix? Write a program to determine the adjacency of a directed graph. (5)

(c) Write the differences between recursion and iteration. (5)

4. (a) Consider the following sequence and construct a B Tree of order 3.

8 3 12 10 7 9 2 6 1 5 13 15 14 (5)

(b) Write a function to traverse a doubly linked list in reverse order. (5)

(c) Prove that maximum number of nodes of a binary tree of height h is $(2^{h+1}-1)$. (5)

5. (a) Distinguish between a graph and a Tree. (5)

(b) Apply the quick sort algorithm on the following sequence: (5)

25 10 30 15 20 28 18 12

(c) Write a recursive algorithm for binary search? (5)

6. (a) What do you mean by efficiency of an algorithm? How can you compare the efficiency of the algorithm? (5)

(b) Write a recursive C/C++ function to count the number of nodes in a linked list. (5)

(c) Write a C/C++ function to delete an element from the root of a binary search tree. (5)

7. Write the short notes on (3 × 5 = 15)

(a) Prims Algorithm

(b) AVL tree

(c) Sequential Search.