Candidate Seat No_____

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

Third Semester of B. Tech. (CE/IT) Examination

Nov-Dec 2018
CE201/CE201.01/CE201.02 Data Structure & Algorithms

Date: 28.11.2018, Wednesday **Time: 10:00 a.m. To 1:00 p.m.** **Maximum Marks: 70**

Instructions:
1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.

Q - 1 **Do as directed.**

(a) What is linear and non-linear data structure? Explain with suitable example. **02**

(b) Differentiate between array and linked list. **02**

(c) Give any two applications of stack data structure. **01**

Q - 2 (a) Let A be a two –dimensional array declared as follows: A: array [1....10] [1....15] of integer. Assuming that each integer takes one memory locations the array is stored in row-major order and the first element of the array is stored at location 100, what is the address of the element A[2][3]? **04**

(b) Explain an algorithm for inserting and removing an element from the simple queue. **05**

(c) Differentiate linear search and binary search. Explain an algorithm with an example for searching an element in binary search. **06**

OR

(c) Show circular queue contents with front and rear after each step with size=5. **06**
(a) Insert 10, 20, 30. (b) Delete (c) Insert 40, 50, 60, 70. Initially queue is empty.

Q:3 **Answer following questions (Any Three)** **[15]**

(a) Sort the following data using Bubble sort. Trace the algorithm.
145,130,19, 85, 12,103,1045 10, 8, 78, 35

(b) Conversion of Infix Expression to Postfix Expression: a + b * (c^(d- e) * f)- g

(c) Explain Tower of Hanoi with N=3 where N is the number of disk.

(d) Generate index for each data using hash function and arrange them into an array A [10]. Use linear probing to resolve collision.

Data: 1104, 806, 1288, 697, 1087, 835, 533, 1407

Hash function H(x) = (x mod 23) + 2.

(e) Write an algorithm for insertion of a node in singly linked list.

SECTION – II

Q - 4 (a) State True of False with justification: **03**
(i) Inorder traversal of a binary search tree arranges data into ascending order.
(ii) Depth first search technique can only be used for undirected graph.
(iii) The indegree of a vertex is the number of edges leaving it.

(b) Give the correct matching for following pairs: **02**

(A) O(logn)	(P) Selection Sort
(B) O(n)	(Q) Insertion Sort
(C) O(nlogn)	(R) Binary Search
(D) $O(n^2)$	(S) Merge Sort

(a) A-R B-P C-Q D-S (c) A-R B-P C-S D-Q

(b) A-P B-R C-S D-Q (d) A-P B-S C-R D-Q

Q - 5 (a) Construct the Binary Search Tree using following data. Show each steps. **06**

32, 45, 12, 11, 13, 92, 78, 66, 17, 70, 98, 108.

Delete 92 and then 32 from the tree. Draw tree after each deletion.

(b) Define input restricted queue and output restricted queue. **03**

(c) Trace the following numbers using radix sort. **06**

9, 1106, 9099, 6, 7101, 990, 15, 99, 10, 909

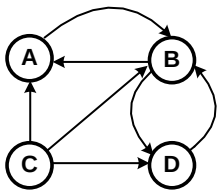
OR

(c) Explain different types of file indexing methods stating their advantages and disadvantages. **06**

Q - 6 Answer following questions (Any Three) **[15]**

(a) Write and explain an algorithm for Breath First Search (BFS) traversal for undirected graph with a suitable example.

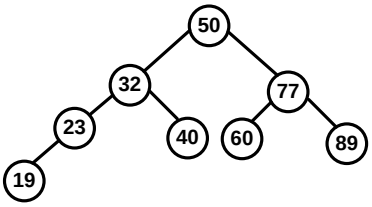
(b) Draw the adjacency matrix of the following graph and find A^2 from it.



(c) Create a max heap tree and sort the given values in ascending order using heap sort with details.

4, –12, 16, 32, 24, 57, –11, 69, 96

(d) Insert 45, 12, 25 and 39 into the following AVL Tree. Draw balanced tree after each insertion with balance factor and pivot node.



(e) Explain merge sort with detailed algorithm.

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