

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

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

March-Apr 2018

CE201.02/CE201.01/CE201 Data Structure & Algorithms

Date: 4.4.2018, Wednesday

Time: 1:30 p.m. To 4:30 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

- (a) In a selection sort of n elements, how many times is the swap function called in the complete execution of the algorithm? **01**
(a) 1 (b) $n - 1$
(c) $n \log n$ (d) n^2
- (b) Suppose we are sorting an array of eight integers using quicksort, and we have just finished the first partitioning with the array looking like this: 34 12 56 21 61 89 71 69 74. Which statement is correct? **01**
(a) The pivot could be either 61 or 89. (b) The pivot could be 61 but not 89.
(c) The pivot could be 89 but not 61. (d) The pivot could neither be 61 nor 89.
- (c) Which of the following is not a stable sorting algorithm in its typical implementation? **01**
(a) Insertion Sort (b) Merge Sort (c) Bubble Sort (d) None of the above
- (d) For given array of float A [-100:52, 60:89] find the total number of elements. Assume that Base address is 5001. Find address of A [0, 71] element, if it is stored in row major order. **02**

- Q - 2 (a) Find 32 element from below given data using linear search and binary search technique. Also note down total number of comparisons in both technique. **04**

5,8,11,15,25,28,29,32

- (b) Covert the given expression into its equivalent postfix expression using stack. Show the contents of stack for each step. **04**

$(a+b)*(c^{(d-e)}+f)-g$

- (c) What are the advantages of circular queue over simple queue? Explain insertion operation in the Circular queue with all the conditions. **05**
- (d) For the given non empty doubly linked list, select correct steps for inserting element at front position. **02**

(L : Left most pointer, R : Right most pointer, new_node = pointer to new node)

(a) LPTR(new_node)= NULL;

RPTR(new_node)= L;

LPTR(L) = new_node;

L = new_node;

(b) LPTR(new_node)= NULL;

RPTR(new_node)= L;

LPTR(R) = new_node;

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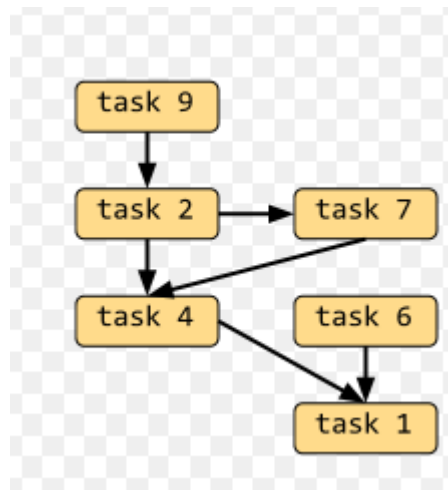
L = new_node;
(c) LPTR(new_node)= R;
RPTR(R)= new_node;
RPTR(new_node) = NULL;
R = new_node;
(b) LPTR(new_node)= NULL;
RPTR(new_node)= L;
LPTR(L) = new_node;
L = R;

```

OR

- (d) Find the Topological Ordering of the following graph.

02



Q:3 Answer following questions (Any Three)

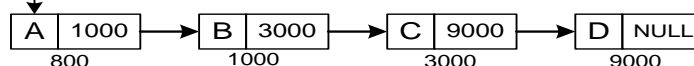
[15]

- (a) Show the sequence of integers (at the end of each pass) that represent the content of the array [25, 23, 15, 22, 6] after 4 passes of Insertion Sort.
- (b) A circular queue is given with the value of F=2, R=3 and size=3. Perform the following operations successively on the circular queue and show contents of Q, F and R after each operation. Insert (9), Insert (12), Delete, Delete, Delete, Insert (14), Insert (-4), Insert (1).
- (c) Sort the following data using Radix Sort.

[COW, DOG, SEA, RUG, ROW , MOB , BOX, TAB, BAR]

- (d) Explain how stack data structure is used for recursive Fibonacci function.

- (e) FIRST



The following sequence of operations are performed on the above singly linked list called

Struct node *P;

(i) P = First → link;	(ii) P → link → link → link = First;
(iii) P = P → link → link → link;	(iv) printf("%c", P → data);

Show content of singly linked list after each operation.

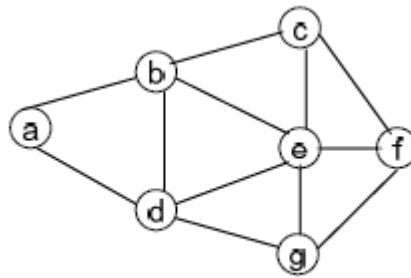
SECTION – II

- Q - 4 (a)** Differentiate between array and linked list. **02**
- (b)** Which is best data structure to check whether an arithmetic expression has balanced parenthesis or not? **01**
- (c)** Merge sort is not in-place Sorting Algorithm, Justify the statement. **02**

- Q - 5 (a)** Evaluate the given expression with the help of stack. Show each step. **04**

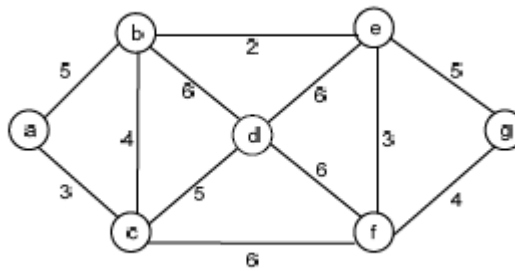
$$4 \ 2 \ 3 \ * \ + \ 5 \ 8 \ / \ 2 \ * \ -$$

- (b)** The inorder and preorder traversal of a binary tree are **d b e a f c g** and **a b d e c f g**, respectively. Construct a tree and write down the postorder traversal of the binary tree. **03**
- (c)** Apply DFS on the following undirected graph (Starting Vertex is a) **05**



OR

- (c)** Consider the following graph: **05**



Which one of the following is NOT the sequence of edges added to the minimum spanning tree using Kruskal's algorithm? Justify your answer.

- (A) (b, e) (e, f) (a, c) (b, c) (f, g) (c, d)
- (B) (b, e) (e, f) (a, c) (f, g) (b, c) (c, d)
- (C) (b, e) (a, c) (e, f) (b, c) (f, g) (c, d)
- (D) (b, e) (e, f) (b, c) (a, c) (f, g) (c, d)
- (d)** The following sequence of operations is performed on a stack: **03**

PUSH (10), PUSH (20), POP, PUSH (10), PUSH (20), POP, POP, POP, PUSH (20), POP.

What is the sequence of values which are popped out?

Q - 6 Answer following questions (Any Three)

15

- (a) Discuss tower of hanoi problem for N=3 discs with recursive tracing.
- (b) A heap tree stores priorities (or priority-element) pairs at nodes. Demonstrate, step by step, the operation of Build-Min Heap on the array (Here only priorities of elements are given)

[103, 11, 101, 110, 111, 119, 19, 91]

- (c) Define graph. Explain storage representation of a graph.
- (d) Construct an AVL Tree from given inputs.
Input Sequence : **21, 26, 30, 9, 4, 14, 28, 18, 15, 10, 2, 3, 7.**
- (e) Arrange the following data in the array using hashing. Use linear probing to resolve collisions. Array size is 8 (index starts from 0)
Data: **50, 47, 19, 21, 11, 45, 6, 25**
Hash function **$H(x) = ((x^2) \bmod 5) + 3$**
