

6E3113

Roll No. \_\_\_\_\_

Total No of Pages: 4

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B. Tech. VI Sem. (Main & Back) Exam., May/June-2014

Electrical Engineering  
6EE 5 Data Structures In C  
Common for EX, EE

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

**Instructions to Candidates:-**

*Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.*

*Units of quantities used/ calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.*

1. \_\_\_\_\_

2. \_\_\_\_\_

### UNIT-I

Q.1 (i) Discuss the following asymptotic notations with example. [10]

(a) Big - oh (O)

(b) Small - oh (o)

(c) Theta ( $\theta$ )

(d) Omega ( $\Omega$ )

(e) Small-omega ( $\omega$ )

(ii) Show that the solution to -

$T(n) = 2T(\lfloor n/2 \rfloor) + n$  is  $o(n \log n)$  [6]

**OR**

- (i) What is circular linked list? Write an algorithm to add a node at the end of circular linked list. [4+6]
- (ii) Show that the worst case running time of heap sort is  $\Omega(n \log n)$  [6]

**UNIT-II**

Q.2 (i) Suppose multi-dimensional arrays A & B are declared using - [4+4]

A (-2 : 2, 2 : 22) & B (1 : 8, -5 : 5, -10 : 5)

then find -

- (a) Length of each dimension. & the number of elements in array A & array B.
- (b) Consider the element B [3, 3, 3] in B, find the effective indices  $E_1, E_2, E_3$  & the address of the element, assuming Base (B) = 400 & there are  $w = 4$  words per memory location. (assuming B is stored in column - major order)
- (ii) What are tri-diagonal & triangular matrices? How is sparse matrix stored in the memory of a computer? Explain with the help of suitable examples. [4+4]

**OR**

Write algorithms to perform following operations on sparse-matrices [8+8]

- (i) Addition of sparse-matrices
- (ii) Multiplication of sparse -matrices

**UNIT-III**

Q.3 (i) Write an algorithm to evaluate a postfix expression given as a string of characters using stack. [10]

- (ii) Evaluate the postfix expression given below & explain the intermediate steps & also find the contents of the stack - [6]

7 2 3 + - 2 /

**OR**

- (i) What is circular queue? Write an algorithm to perform following operations on a circular queue - [2+4+4]

- (a) Insertion in circular Queue.  
(b) Deletion in circular Queue.

- (ii) Translate the following infix expressions into postfix notations- [6]

(a)  $((A+B) * D) \uparrow (E - F)$

(b)  $A + (((B - C) * CD - E) + F) \uparrow (G) \uparrow (H - J)$

**UNIT-IV**

- Q.4 (i) Define max. heap & min. heap. How will you represent a max. heap as on Array? Write an algorithm to insert an element to a max. heap. [2+3+7]
- (ii) Explain binary tree traversals by using a suitable example. [4]

**OR**

- (i) What is height balance tree? Construct an AVL search tree by inserting the given elements- [4+8]

6, 7, 8, 12, 15, 17, 9, 10

- (ii) Define a B-tree of order m. Give an example of a B-tree of order 2. [4]

## UNIT-V

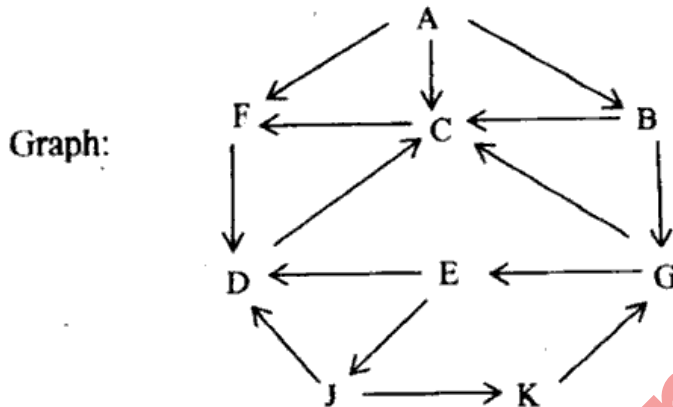
Q.5 Explain BFS & DFS graph traversal algorithm. Then find-

[8+4+4]

(a) Minimum path from node A to node J in given graph.

(b) All the nodes reachable from node J.

(including node J itself)



(i) Write an algorithm for merge sort. Sort the sequence of numbers using the algorithm - [4+4]

42, 23, 74, 11, 65, 57, 94, 36, 99, 87, 70

(ii) let G be an undirected connected graph. By using Kruskal's algorithm find minimum cost spanning tree & its cost. [8]

Graph (G):

