B. E. II Year (Sem. III) Examination, February - 2010
Data Structures & Algorithms
(Common for 3EC6, 3Ei6 & 3BM6 (Main & Back))

Time : 3 Hours]

[Total Marks : 80
[Min. Passing Marks : 24

*Attempt overall **five** questions. All questions carry **equal** marks.*
Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. _____ Nil _____   2. _____ Nil _____

1 (a) Why space and time complexity must be considered while writing a code ?

   (b) Explain big oh and omega notations along with their significance.

                                                                8+8

OR

1 (a) Explain the representation of linked list in a memory.

   (b) Write C function to insert the element x after a given node in a doubly linked list.

                                                                8+8

2 Suppose a three-dimensional array MAZE is declared using MAZE (2:8, –4:1, 6:10). Suppose the programming language stores MAZE in memory in row-major order and suppose Base (MAZE) = 200 (base address) and there are W = 4 words per memory cell. Then calculate :

   (i) Total number of elements of MAZE.

   (ii) The address of element at location MAZE [5, –1, 8].

                                                                4+12

OR

2　(a)　Write a C code to perform matrix multiplication operation.

(b)　Explain the sparse matrices representation and its significance.

8+8

3　(a)　Convert infix expression X into postfix expression showing stack status after every step in tabular form :

$$X : A+(B*C-(D/E \uparrow F)*G)*H$$

(b)　Explain the tower of Hanoi problem using recursion.

10+6

OR

3　What is Queue ? What are the different operations perform on it ? How the queue is implemented using linked list ? Write algorithm for common operation perform on it.

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4　(a)　A binary tree T has 9 nodes. The inorder and preorder traversals of T yield the following sequences of nodes :

In order	E	A	C	K	F	H	D	B	G
Pre order	F	A	E	K	C	D	H	G	B

Draw the tree T.

(b)　Differentiate between Binary Search tree and indended-binary search tree.
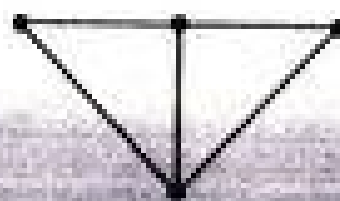
10+6

OR

4　(a)　Write an algorithm for deleting a node from a binary search tree.

(b)　Explain the insertion of an element in an AVL tree by taking suitable example.

8+8

5　(a)　Explain Warshall's shortest path algorithm.

(b)　Define spanning tree. Find all spanning trees of the following graph.

8+8

OR

5   (a)   Suppose an array A contains 8 elements as follows :

77, 33, 44, 11, 88, 22, 66, 55

Sort this array using selection sort.

Show all intermediate steps.

     (b)   Differentiate between :

       (i)   Heap sort and Merge sort

       (ii)   BFS and DFS.

8+8

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