SEAT NO. :

S.E. 2008 (Information Technology)
DATA STRUCTURES AND FILES (214448)
(Semester – II)

Time: 3 Hours   **Max. Marks : 100**

Instructions to the candidates:
1) Answer Question Nos. 1 or 2, 3 or 4, 5 or 6 from Section-I and Question Nos. 7 or 8, 9 or 10 and 11 or 12 from Section-II.
2) Answers to the two sections should be written in separate answer books.
3) Answer any three questions from each section.
4) Neat diagrams must be drawn wherever necessary.
5) Figures to the right side indicate full marks.
6) Use of Calculator is allowed.
7) Assume Suitable data if necessary

SECTION I

Q1) a) Assume a hash table of size 10 and hash function H(X)=X mod 10, perform linear probing with and without replacement for the given set of values.   1, 2, 4, 72, 65, 85, 87, 90, 58, 52   [8]

b) Write a 'C' program to implement all primitive operations on sequential file.   [8]

OR

Q2) a) Explain various file opening modes with respect to text and binary files.   [8]

b) Write a 'C' program to perform following operations on Direct Access File   [8]
    i) Search record with given key values
    ii)Delete record with given key value

Q3) a) Write an algorithm to convert an infix expression to postfix form.Explain with suitable example   [8]

b) Transform each of the following prefix expression to infix form. clearly show the contents of stack   [8]
    i)   * + a – b c / - d e + - f g h
    ii)   - + / a ^ b c * d e * a c

OR

Q4) a) What is stack? Write a 'C' program to convert decimal number to binary using stack.   [8]

b) Clearly indicate the contents of stack for evaluating the given postfix expression: 6 2 3 + - 3 8 2 / + * 2 ^ 3 +   [8]

Q5) a) Define linear queue. What are the disadvantages of linear queue. Write a 'C' program to implement linear queue using linked organization   [10]

b) Write a pseudo C code for implementation of circular queue using array.   [8]

OR

**Q6)** a) Define deque. Write a 'C' program to implement deque using linked organization   [10]

b) Write a pseudo C code for implementation of priority queue. [8]

SECTION II

Q7) **a)** Define the following with respect to trees with example: [8]

      1. Internal node   2. Sibling
      3. Ancestor   4. Height
      5. Binary tree   6. Balance factor
      7. Path   8. Level

b) Why do we need to convert a General Tree to Binary Tree? Write down [8]
the steps to convert a General Tree to Binary Tree. Convert the given tree
to Binary tree.
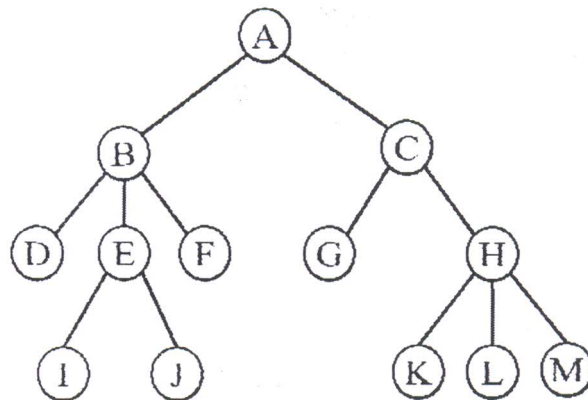
OR

Q8) **a)** What is Binary search tree? Write a pseudo for deletion and insertion of a [8]
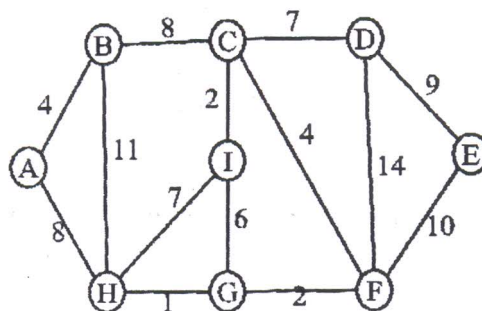node in Binary search tree.

b) Construct an expression tree from the given traversals: [8]
Inorder : a − b − c * d + e − f − g
Postorder : a b − c d * - e f g - - +
Write non-recursive preorder and inorder traversal algorithms for binary
tree.

Q9) **a)** Define Minimum Spanning Tree. Write an algorithm for Prim's method. [8]
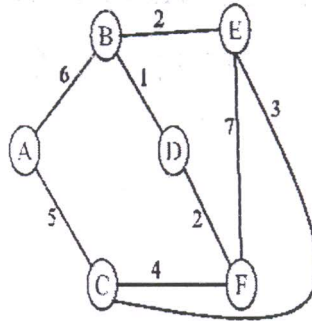Find minimum spanning tree for the given graph using Krushal's method.

b) Write a pseudo code and find the shortest path using Dijkstra's Algorithm [8]
from node A to every other node in the graph shown below:
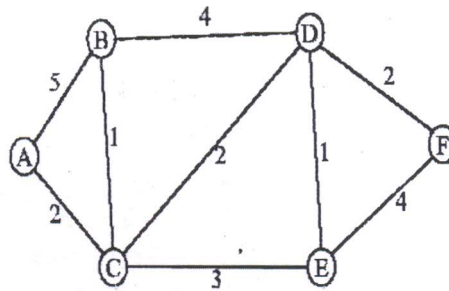
OR

Q10) a) Give the adjacency matrix for the given graph. Write the algorithm for DFS and BFS traversals on the graph. [8]

b) Define the following terms with respect to Graphs: [8]
1. Digraph   2. Weakly connected graph
3. Degree of a vertex   4. Cycle
5. Loop   6. Spanning tree
7. Disjoint graph   8. Strongly connected graph

Q 11) a) Sort the following numbers in descending order using heap sort : [10]
22, 45, 11, 8, 66, 10, 55, 32, 9, 72.
Show the sorting stepwise.

b) Why is Huffman code used for data compression? Draw a Huffman tree for the given data set and find the corresponding Huffman codes : [8]

A	9	H	3
B	4	I	9
C	2	J	11
D	4	K	6
E	10	L	7
F	3	M	4
G	8	N	8

OR

Q 12) a) Construct an AVL search tree by inserting the following elements in the order of their occurrence. Show the balance factor and type of rotation at each stage : [12]
16, 25, 9, 12, 35, 58, 82, 68, 72

b) Write a note on: [6]
1. Symbol Table
2. Applications of Heap data structure