

Total No of Questions: [12]

SEAT NO. :

[Total No. of Pages : 3]

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 $H(X) = X \bmod 10$, 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]

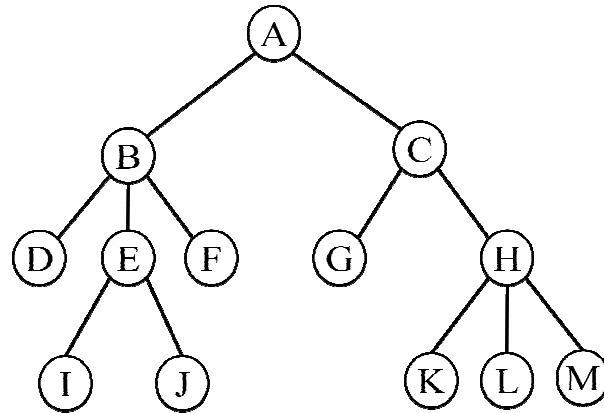
- b) Write a pseudo C code for implementation of priority queue. [8]

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 the steps to convert a General Tree to Binary Tree. Convert the given tree to Binary tree. [8]



OR

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

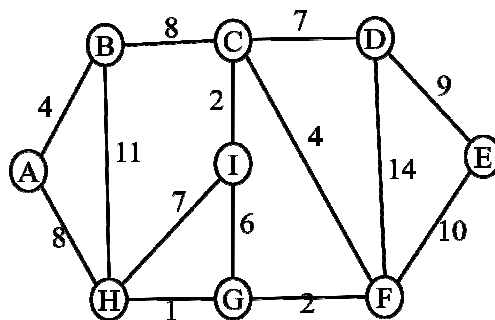
- b) Construct an expression tree from the given traversals: [8]

Inorder : $a - b - c * d + e - f - g$

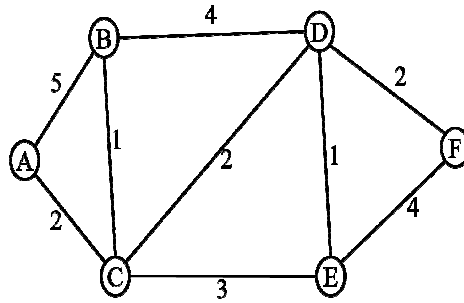
Postorder : $a b - c d * - e f g - - +$

Write non-recursive preorder and inorder traversal algorithms for binary tree.

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

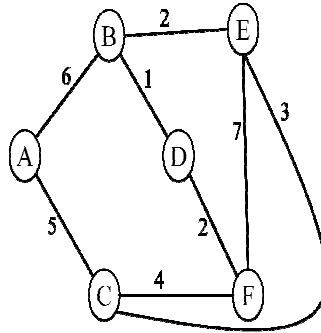


- b) Write a pseudo code and find the shortest path using Dijkstra's Algorithm from node A to every other node in the graph shown below: [8]



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