Total No. of Questions—**12**] [Total No. of Printed Pages—**4+2**

[3762]-235

S.E. (IT) (Second Semester) EXAMINATION, 2010

DATA STRUCTURES AND FILES

(2008 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer any *three* questions from each Section.

(*ii*) Answers to the two sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Assume suitable data, if necessary.

SECTION I

1. (*a*) Write an algorithm for chaining with replacement used as a technique for synonym resolution. [8]

(*b*) State advantages and disadvantages of indexed file and sequential file. [6]

(*c*) Write characteristics of good Hash function. [4]

Or

2. (*a*) Write notes on sequential and direct access file organizations. [6]

(*b*) Write an algorithm for linear probing without replacement strategy. [4]

P.T.O.

(c) For the given set of values :

8, 41, 15, 60, 10, 76, 85, 11, 109, 43

Create a Hash table and resolve collisions using chaining with and without replacement.

(Hash function to be used : X Mod 10) [8]

3. (a) Clearly indicate the contents of stack during evaluation of the following postfix expression :

ab – cd/*e+

The values are : $a = 8$, $b = 6$, $c = 10$, $d = 5$, $e = 7$. [8]

(b) Write the 'C' code for stack as ADT. [8]

Or

4. (a) Write an algorithm to convert an infix expression to prefix form. [8]

(b) What do you understand by Multistack ? Give the 'C' structure representation of the same. Use this representation to implement Push and Pop operations. [8]

5. (a) Define linear queue. How to represent it using linked organization ? Explain its any *one* application in detail. [10]

(b) What are the applications of the data structure priority queue ? [4]

(c) Define dequeue and give its example. [2]

Or

6. (a) What is priority queue ? What is its use ? Give the function to add an element in priority queue. [10]

(*b*) Define Multiqueue. [2]

(*c*) Explain the advantage of circular queue over linear queue with an example. [4]

SECTION II

7. (*a*) Write an algorithm to accept a prefix expression and construct its binary tree and perform recursive and non-recursive in-order traversal of the tree. [10]

(*b*) Suppose the following sequences list the nodes of a binary tree T in pre-order and in-order, respectively :

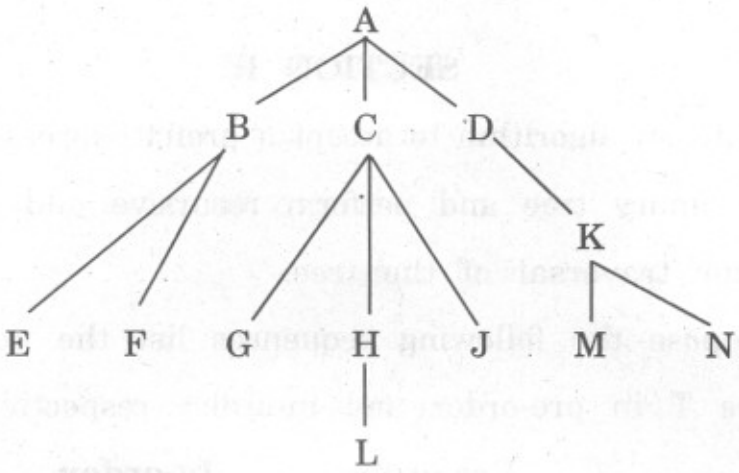
Pre-order	**In-order**
G	Q
B	B
Q	K
A	C
C	F
K	A
F	G
P	P
D	E
E	D
R	H
H	R

Draw the tree. [6]

(*c*) Define and give example of in-order threaded binary tree. [2]

Or

8. (*a*) What is the necessity of converting a tree into binary tree? Given the following tree :

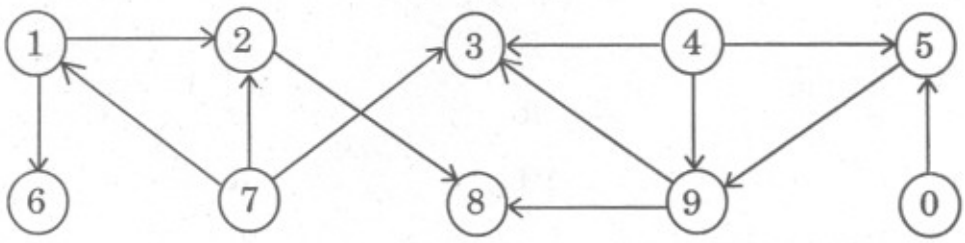


Convert it into a binary tree and list down the steps for the same. [6]

(*b*) Write an algorithms to delete a node from binary search tree. [6]

(*c*) Write recursive algorithm to find number of leaf nodes and the height of binary tree. [6]

9. (*a*) For the graph given below, find BFS & DFS. (Show steps)



[8]

(*b*) Describe various ways in which graphs are represented. [6]

(*c*) Define minimum spanning tree with an example. [2]

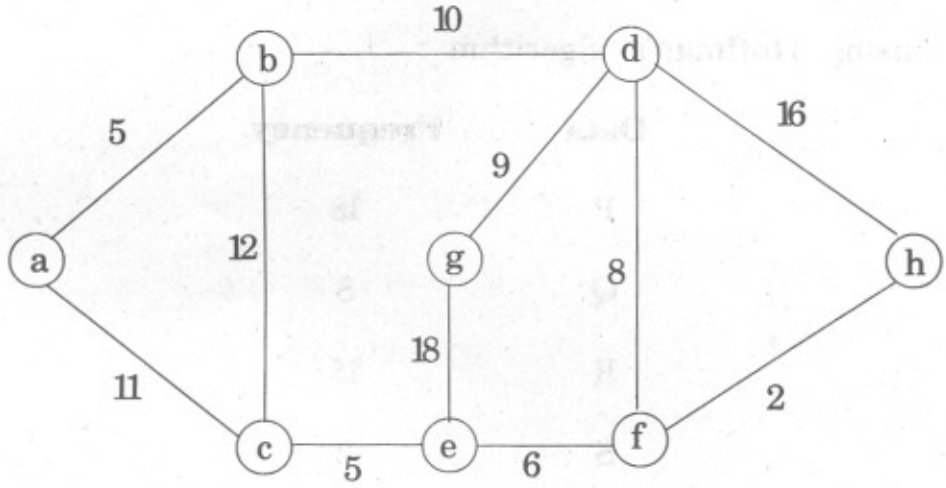
Or

10. (*a*) Give the definition with an example for the following terms :

(*i*) Subgraph

(*ii*) Strongly connected component [2]

(*b*) Find minimum spanning tree using Prim's and Kruskal's method for the following graph. Write algorithm for any *one* of the above two methods : [10]



(*c*) Write a short note on Dijkstra's algorithm. [4]

11. (*a*) Sort the following numbers in ascending order using heap sort :

2, 3, 6, 4, 35, 72, 11, 5, 61

Show the sorting stepwise. [8]

(*b*) Give *one* example each for each of the four types of rotations possible in an AVL tree with explanation. [8]

Or

12. (*a*) Obtain an AVL tree by inserting one integer at a time in the following sequence :

148, 153, 158, 1000, 112, 145, 120, 149, 128, 146

Label the rotations appropriately at each stage. [10]

(*b*) Explain the steps to encode and decode the following data using Huffman's algorithm : [6]

Data	Frequency
P	18
Q	8
R	15
S	2
T	25
U	13
V	5
W	26

(*b*) Give *one* example each for each of the four types of rotations possible in an AVL tree with explanation. [8]

Or

12. (*a*) Obtain an AVL tree by inserting one integer at a time in the following sequence :

148, 153, 158, 1000, 112, 145, 120, 149, 128, 146

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