

S.E. (I.T.) (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. (1) Explain various file opening modes with respect to text and binary files. [6]

(2) Explain the features of a sequential file. Write a 'C' program to copy contents of one file to another using command line arguments. [6]

- (3) What are the characteristics of a good hash function ? How can collision be resolved in a hash table. [6]

Or

2. (1) Compare text and binary files. [6]
- (2) Explain features of a random access file. Write a 'C' program to find sum of the nos. passed as command line arguments. [6]
- (3) Assume a hash table of size 10 and hash function : [6]

$$H(X) = X \bmod 10.$$

Perform linear probing with and without replacement for the given set of values :

0, 1, 4, 71, 64, 89, 11, 33, 58, 45.

3. (1) Write a note on applications of stacks. [4]
- (2) Implement stack as an ADT using sequential organisation. [6]
- (3) Clearly indicate the contents of stack for evaluating the given postfix expression : [6]

$$623 + -382 / + * 2 \$ 3 +$$

Or

4. (1) Write a note on implicit and explicit stacks. [4]

- (2) Clearly indicate the contents of stack during conversion of given infix expression to prefix : [8]

$$A \wedge B * C - D + E/F/(G + H).$$

- (3) Implement push and pop operations for stack using linked organisation. [4]

5. (1) Write a 'C' program to implement priority queue. [8]

- (2) Consider a circular queue of characters and is of size 6. "-" denotes an empty queue location. Show the queue contents as the following opns. take place : [8]

(i) F is added to the queue.

(ii) Two letters are deleted.

(iii) K, L and M are added to the queue.

(iv) Two letters are deleted.

(v) R is added to the queue.

(vi) Two letters are deleted.

(vii) S is added to the queue.

(viii) Two letters are deleted.

Initial queue configuration is :

FRONT = 2, REAR = 4, Queue : —, A, C, D, —, —

Or

6. (1) Implement circular queue as an ADT. [8]
- (2) Consider the following circular double ended queue of chars and is of size 6. LEFT = 2, RIGHT = 4, DEQUE : —, A, C, D, —, — [8]

Describe the deque contents as the following opns. take place :

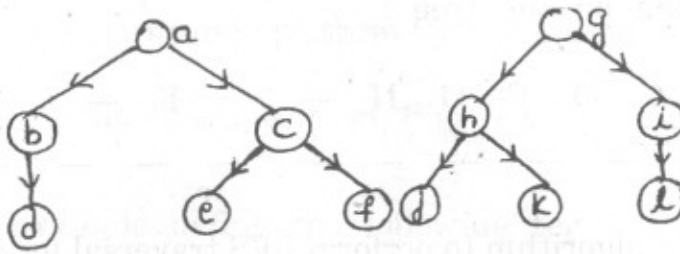
- (i) F is added to the right of the dequeue.
- (ii) Two letters are deleted on the right.
- (iii) K, L and M are added to the left of the dequeue.
- (iv) One letter on the left is deleted.
- (v) R is added to the left of the dequeue.
- (vi) S is added to the right of the dequeue.
- (vii) T is added to the right of the dequeue.

SECTION II

7. (1) Write 'C' functions for all three binary tree traversals non-recursively. [6]

(2) Convert the given forest into a binary tree.

[6]



(3) With examples, define the following terms w.r.t. trees : [6]

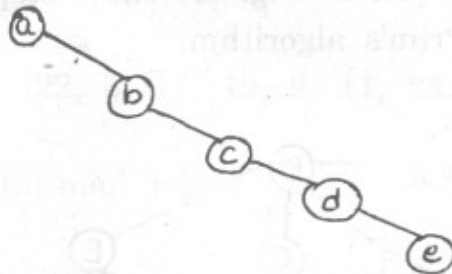
(i) Stewed binary trees

(ii) Complete binary tree

(iii) Ancestor, descendant, leaf node.

Or

8. (1) List down the formulae to represent binary trees using array.
Represent the given tree using array. [6]



(2) Construct a binary tree from the given traversals : [6]

Pre-order : * + a - b c / - d e - + f g h

In-order : a + b - c * d - e / f + g - h

- (3) For the binary tree represented as an array, perform in-order threading on the tree : [6]

A B C D E G H — — F — — — J K —
 — — — — — — — — — — L — —

9. (1) Write an algorithm to perform BFS traversal for a graph. Perform the same for the given graph. [8]

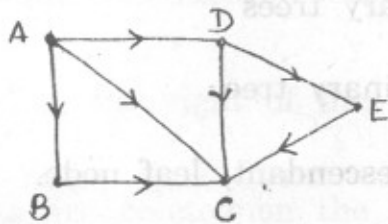


Fig. (a)

- (2) For the graph in Fig. (a) draw adjacency list and adjacency matrix. [4]
- (3) For the graph given in Fig. (b) show stepwise representation of MST using Prim's algorithm. [4]

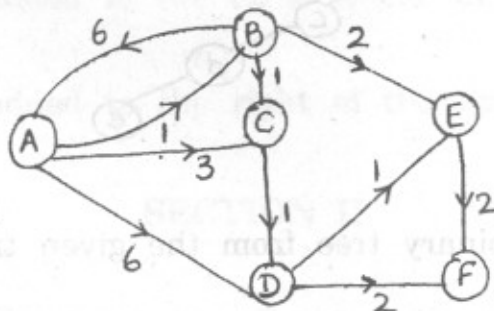


Fig. (b)

Or

10. (1) Write an algorithm to perform DFS traversal for a graph. Perform the same for the graph in Fig. (a). [8]
- (2) With example define the following terms w.r.t. graphs : [4]
- (i) Degree of node
 - (ii) Isolated node
 - (iii) Path
 - (iv) Cycle.
- (3) For the graph given in Fig. (b) show stepwise representation of MST using Kruskal's algorithm. [4]

11. (1) Suppose A to H are 8 data items with weights as follows : [8]

22, 5, 11, 19, 2, 11, 25, 5.

Build a Huffman tree and find code of each symbol.

- (2) Construct an AVL search tree by inserting the following elements in the order of their occurrence. Show the BF and type of rotation at each stage : [8]

64, 1, 44, 26, 13, 110, 98, 85.

Or

12. (1) Distinguish between Huffman's tree, OBST and AVL in terms of their definitions and applications. [8]

(2) Sort the following nos. using heap sort : [8]

17, 25, 8, 0, 1, 250, 1008, 65, 48, 101.