

[4062]-215

S.E. (IT) (Second Semester) EXAMINATION, 2011

DATA STRUCTURE AND FILES

(2008 PATTERN)

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 a note on command line arguments. [4]
- (b) Compare between the following file read functions. [8]
fscanf, fread, fgets and fgetc.
- (c) Compare sequential and index sequential files. [4]

Or

2. (a) Compare between the following file read functions : [8]
fprintf, fwrite, fputs and fputc.
- (b) Write C implementation of all primitive operations on sequential file. [8]

P.T.O.

3. (a) Consider the program

```
int fact (int n)
```

```
{
```

```
    Int x, y;
```

```
    If (n == 0)
```

```
        return (1);
```

```
    x = n-1;
```

```
    y = fact(x);
```

```
    return(n*y);
```

```
}
```

Suppose a calling program contains the following statement

Print ("%d", fact(4));

Display the contents of the stack for the variables n, x and y as execution of the fact function proceeds. [8]

- (b) Write a program to convert an infix expression to postfix. [6]

- (c) Transform each of the following prefix expressions to infix. [4]

+-\$ABC*D**EFG

++A-*\$BCD/+EF*GHI

Or

4. (a) Write a program for implementation of stack as an ADT using sequential organisation. [8]

- (b) Evaluate the following postfix expressions. Assume $A = 1$, $B = 2$, $C = 3$ [4]

$AB + C - BA + C\$-$

$ABC + *CBA - + *$

- (c) Give the data structures for implementation of stacks using both sequential and linked organisation. Give applications of stack. [6]

5. (a) Consider the following deque of characters where DEQUE is a circular array which is allocated six memory cells : LEFT = 2, RIGHT = 4, DEQUE : __, A, C, D, —, — Describe the deque while the following operations take place : [8]

(i) F is added to the right of the deque;

(ii) Two letters on the right are deleted;

(iii) K, L and M are added to the left of the deque;

(iv) One letter on the left is deleted;

(v) R is added to the left of the deque;

(vi) S is added to the right of the deque;

(vii) T is added to the right of the deque.

- (b) Implement circular queue as an adt using linked list. [8]

Or

6. (a) Write a note on priority queues. [4]

- (b) Differentiate between a queue and an array. List down the applications of queues. [6]
- (c) Write the pseudo code for implementation of circular queue using arrays. [6]

SECTION II

7. (a) Define the following with respect to trees with examples : [8]
- (i) Complete binary tree
 - (ii) Predecessor and Successor
 - (iii) Skewed binary tree
 - (iv) Height of tree
- (b) Write non-recursive preorder and inorder traversal algorithms for inorder threaded binary tree. [8]

Or

8. (a) Write functions for non-recursive inorder and preorder traversals for binary trees. [8]
- (b) Parenthesis are not given in an expression in prefix or postfix. Justify. Draw the expression tree and find the infix and postfix expressions for the following prefix expression.

*-AB + * CD/EF [8]

9. (a) Define a graph. For the given adjacency matrix draw the graph and its adjacency list : [8]

	A	B	C	D	E	F	G	H
A	0	1	1	0	0	0	0	0
B	1	0	0	0	1	0	0	0
C	1	0	0	1	0	1	0	0
D	0	0	1	0	0	0	0	1
E	0	1	0	0	0	0	1	0
F	0	0	1	0	0	0	1	1
G	0	0	0	1	0	1	0	0
H	0	0	0	1	0	1	0	0

Find all the nodes adjacent to node A, node F and node G.

- (b) Write the algorithm to find the shortest path from every node to every other node in a graph using Dijkstra's algorithm. Find the same for any graph of your choice. [8]

Or

10. (a) For the given adjacency matrix, draw the graph : [10]

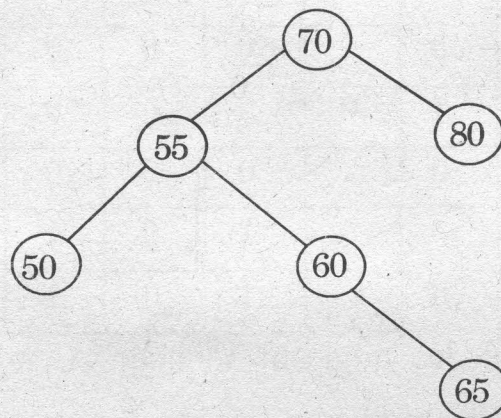
	A	B	C	D	E	F
A	0	3	4	0	2	1
B	0	0	2	0	0	3
C	0	0	0	2	6	1
D	2	6	1	0	1	2
E	0	0	0	0	0	3
F	0	0	0	0	0	0

Fig (a)

Write the pseudocode for Prim's algorithm and find the MST by showing all the steps.

- (b) For the graph of fig. (a) write the pseudocode for Kruskal's algorithm and find the MST by showing all the steps. [6]

11. (a) Balance the AVL tree given in Fig. a. Show the balance factors in the result. [10]



Insert 49, 68, 44, 66, 77 to the resultant tree and show all the balance factors.

- (b) Draw a Huffman's tree for the given data set and find the corresponding Huffman codes : [8]

Character	Weight	Character	Weight
A	10	H	3
B	3	I	6
C	4	J	8
D	15	K	7
E	2	L	5
F	4	M	12
G	2	N	5

Or

12. (a) Define a heap. With examples describe different types of heaps. Make a heap out of the following data read from the keyboard : 23, 7, 92, 6, 12, 14, 40, 44, 20, 21. [12]

Sort the heap in ascending order.

- (b) Write a note on OBST. [6]