

Total number of printed pages - 7

B. TECH/BCSE 3102

MCA / PCS 1002

B. ARCH / PCS 1001

2ND SEMESTER EXAMINATION -APRIL 2005

DATA STRUCTURE USING 'C'

Full Marks - 70

Time : 3 Hours

*The figures in the right hand margin indicate
full marks for the questions.*

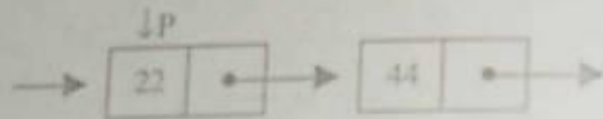
Answer questions No. 1 and five other questions.

1. Answer the following : 2x10
- (a) Consider an array $a[10]$ of floats; if the base address of a is 1000, find the address of $a[3]$.
- (b) Given a linked list, a part of which is shown below, write an algorithm for inserting a new

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node after the node containing 22 to which the pointer P points

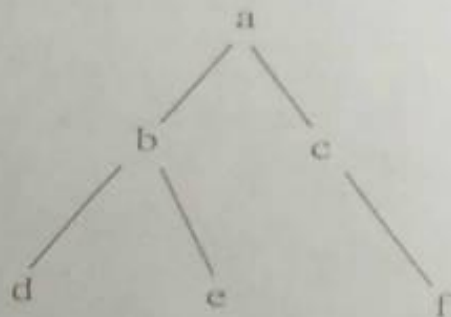


(c) Define a stack; give two examples (from computer science) where you use stacks.

(d) Store the following polynomial in a linked list :

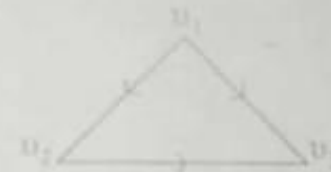
$$2x^3 - 5x^2 + 3x - 7$$

(e) Write down the sequence of nodes that will be processed in the post order traversal of the tree given below :



(f) A binary tree has 10 nodes; how many edges does it have? Draw a complete binary tree with 10 nodes to check your answer.

(g) Write down the adjacency matrix of the following graph.



(h) Convert the following infix expression to postfix expression :

$$(a + b) * (c - d)$$

(i) With the sequence of inputs

10, 8, 20, 5, 3

construct a height balanced binary search tree.

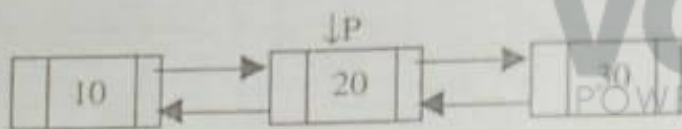
(j) Define recursion; give two examples (from computer science) where you can use recursion.

2. (a) Write a C program to (i) create an array of integers and (ii) to print the even integers in the array, (iii) to print every third integer starting from a [0]. 5

(b) Convert the following infix expression to one in postfix expression : 5

$$x + (y * z - (a / b \uparrow e) * d) * e$$

3. (a) Given a doubly linked list :



write a block of C code to delete the node containing 20 to which the pointer P points.

(b) Use a stack to evaluate the following postfix expression : 5

$$11, 2, -, 3, 2, \uparrow, +, 3, 6, 2, /, 5, *, -, +$$

4. (a) Write a C program to sort a given array of

integers in increasing order, using the bubble sort technique. 5

(b) Explain the quick sort algorithm. You may use the following sequence of integers to illustrate your case : 5

41, 31, 11, 51, 71, 91, 61, 99, 21, 81

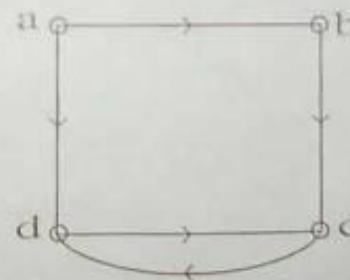
(a) Create a heap from the following sequence of integers : 5

50, 40, 60, 80, 70, 20, 90, 10, 8, 2, 5, 100

(b) Use radix sort to sort the following integers : 5

128, 539, 365, 861, 792, 573, 374, 255, 427.

5. (a) Define a directed graph. Given the directed graph. 5

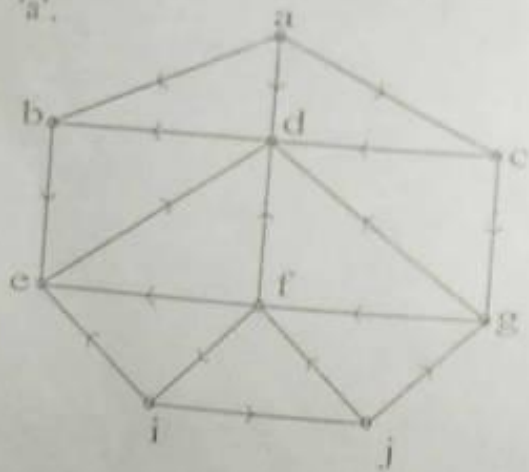


write down its adjacency matrix. Define the reachability matrix of a directed graph. Write down the reachability matrix of the graph given above by inspection.

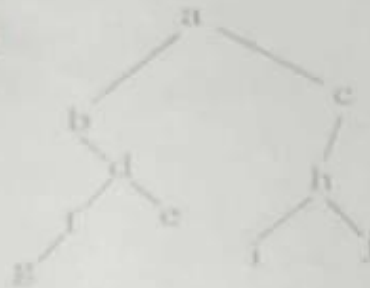
(b) Describe Warshall's shortest path algorithm for a directed graph.

7. (a) What do you mean by hashing? Describe any three hash functions with examples.

(b) Given the directed graph (below), find the order in which the nodes shall be processed in a breadth-first search, starting from node 'a'.



8. (a) Given the tree below, describe the order in which the nodes will be processed in the preorder traversal of the tree.



(b) (i) Write a short note on garbage collection.

(ii) Define a sparse matrix; how can you store a sparse matrix efficiently?