PGDCA / MCA (I Yr)

Term-End Examination

June, 2008

CS-04 : DATA STRUCTURES THROUGH "C" & "PASCAL"

Time : 2 hours *Maximum Marks : 60*

Note : *Question number 1 is **compulsory**. Answer any **three** questions from the rest. All algorithms should be written nearer to C or PASCAL language.*

1. (a) Let P be a printer to a doubly linked list. Show how this list may be used as a queue by writing algorithms to add and delete elements. Specify the value for 'P' when the queue is empty. 7.

(b) Write a program in 'C' language to implement quick sort recursively. Show the working of partition function on the following records of data :

15, 5, 25, 2, 40, 7, 50, 12

clearly mentioning the position of pivot element after 1st iteration. 8

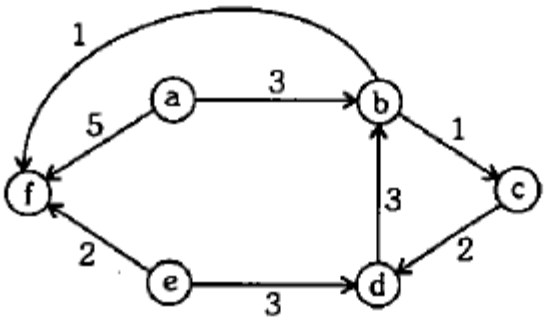
(c) Write an algorithm to convert an infix expression into postfix expression. Also, convert the following prefix expression into postfix expression : 7

(i) / / • + A B C D E

(ii) − + A • B / C D E

(d) Show how a polynomial can be represented using a linked list. Write a C function to multiply two polynomials. *8*

2. (a) Consider the following digraph :



Write a function to find transitive closure of adjacency matrix represented by a digraph. Explain with the given digraph. *6*

(b) Write at least two differences between a Structure and a Union in 'C' language. Give an example each of a Structure and a Union. *4*

3. (a) Draw a linked list representation of the following sparse matrix : *6*

$$\begin{bmatrix} 0 & 2 & 0 & 0 \\ 0 & 11 & 0 & 0 \\ 5 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

(b) What is an AVL tree ? How does it differ from a Binary tree ? 4

4. (a) A 3-dimensional integer array X [4] [5] [3] is stored using the column major order. What will the address of X [2] [3] [1] be if the base address is 100 ? Also, calculate the address if the array is stored using row-major order. 5

(b) What are the advantages and disadvantages of pointers in 'C' language ? What types of operations can be implemented on pointers ? 5

5. Write a non-recursive procedure for traversing a Binary Tree in "Postorder". 10