Printed Pages : 4   **MCA – 202**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1467   Roll No. ☐☐☐☐☐☐☐☐☐☐

M.C.A.

(SEM. II) EXAMINATION, 2006-07
DATA AND FILE STRUCTURE USING " C "
(SPECIAL EXAMINATION)

Time : 3 Hours]   *[Total Marks : 100*

Notes :   *(1)   Attempt all questions.*
              (2)   All questions carry equal marks.

1   Attempt any **two** parts of the following :   **10×2=20**

   (a)   Write a program in C, which takes two sorted arrays. A and B with m and n elements respectively and outputs the array C, which contains all the elements of A and B in sorted order. What is the time complexity of your algorithm ?

   (b)   (i)   Write an algorithm to evaluate a post fix expression using stack.

         (ii) Consider the following arithmatic expression P written in post fix notation:

               P : 5, 6, 2, +, *, 12, 4, 1, –

               Evaluate the expression P using the algorithm in the part (i) of the question.

   (c)   Write down both iterative and recursive algorithms to compute the sum of first 1000 natural numbers. What is time complexity in both cases ?

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2 Attempt any **two** parts of the following : **10×2=20**
   (a) Write C function to implement circular queues using an array.
   (b) Write a function that reverses the order of entries in a linked lost.
   (c) Suppose POLY1 and POLY2 are polynomials which are stored as header circular lists. Write a procedure which finds the sum of POLY1 and POLY2.

3 Attempt any **two** parts of the following : **10×2=20**
   (a) Write functions in C that will count :
      (i) all the nodes of a linked binary tree,
      (ii) the leaves (i.e. the nodes with both subtrees empty) of a linked binary tree.
   (b) Consider the following 4-digit employee numbers :
      9614, 5882, 6713, 4409, 1825
      Find 2-digit hash address of each number using :
      (i) The division method with m=97.
      (ii) The mid square method.
      (iii) The folding method without reverse.
      (iv) The folding method with reverse.
   (c) Write down both iterative and recursive versions of binary search algorithm. What is its time complexity ?

4 Attempt any **two** parts of the following : **10×2=20**
   (a) You are given an array of n elements, and you notice that some of the elements are duplicate; that is, they appear more than once in the array. Suggest an algorithm to remove all duplicates from the array in O(n log n) time.

Z-1467]   **2**   **[Contd...**

(b) Write a subprogram SELECTSORT (A, N) which sorts the array A with N elements using selection sort method, test the program manually using :

44, 33, 11, 55, 77, 90, 40, 60, 99, 22, 88, 66.

(c) (i) Write an algorithm to delete an item from a binary search tree.

(ii) Show the results of inserting the keys F, S, Q, K, C, H, T, V, W, M, R, N, P, A, B, X, Y, Z, E in order into an empty B-tree.

5 Attempt any **two** of the following : 10×2=20

(a) A graph G is maintained in memory by a linked representation. Write a procedure to find the following :

(i) Print the list of successors of a given node.

(ii) To find whether or not G is an undirected graph.

(b) (i) Explain Kruskal's method to find the minimum cost spanning tree of a, weighted graph.

Z-1467] 3 [Contd...

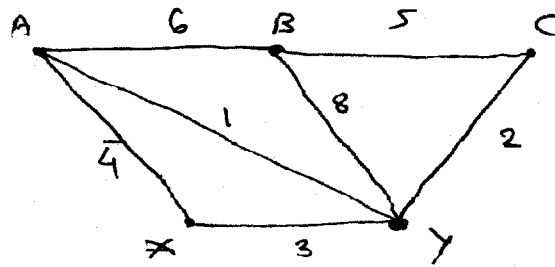(ii) Apply above algorithm on the following graph : (**Fig. 1**)

Fig. 1

(c) Write short notes on :

(i) Sparse Matrices and Vectors

(ii) Huffman Algorithm

(iii) Garbage Collection and Compaction

(iv) Priority Queue.