This question paper contains 4+2 printed pages]

S. No. of Question Paper : **1810**

Unique Paper Code : **251406**   C

Name of the Paper : **CS-II (Data Structure)**

Name of the Course : **B.Sc. (Hons.) Electronics**

Semester : **IV**

Duration : **3 Hours**   Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory.

Attempt any *four* questions out of the remaining Q. Nos. 2 to 7.

Parts of a question must be answered together.

1. (*a*) (*i*) An application is using an ordered linked list to implement its operations. Which searching technique is suitable for this data structure and why ?   3

    (*ii*) What are abstract data types ? Give *one* example.   2

    (*b*) Sort the following list using Merge Sort :   5

    5, 2, 4, 6, 1, 3, 2, 9.

    Show each step of sorting.

    (*c*) Give the class definition of a singly linked list. Write a member function to find sum of all elements of a singly linked list.   5

(*d*)   Consider the following recursive function :   5

200 double power(double x, unsigned int n)

201 {

202   if   (n = = 0)

203   return 1.0:

204   return x* power (x. n–1);

205 }

⬤ ....

100 main( )

101 {
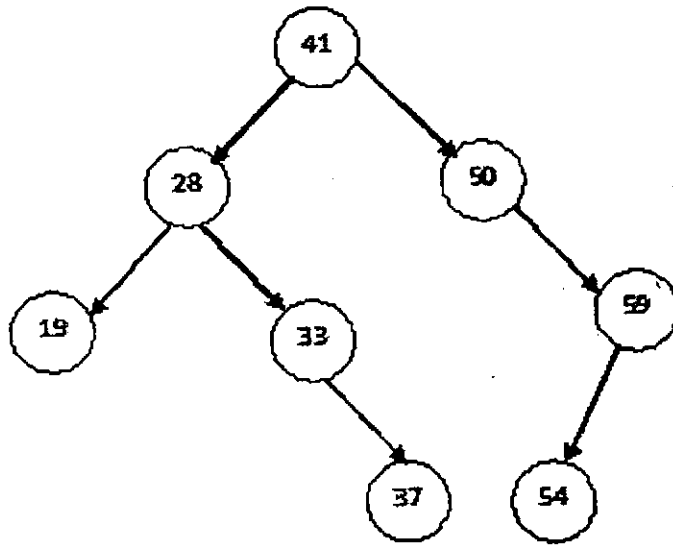
102 y=power(2.5. 3);

103 }

Show the status of run time stack for each call to the function power( ).

(e) Consider a 6 × 5 2-dimensional array stored at base address 400. Find the address of an element stored at index [4, 3] in row major and column major notation.　　5

(f) Consider the following tree :

Insert nodes with value 22. 31 and 57 in the above tree. Show the tree after each insertion and traverse the resultant tree using Breadth First Traversal scheme. Which data structure is used in this traversal scheme ?　　5

(g) Write an algorithm to add two large integers using stacks.　　5

2. (*a*) What is a circular linked list ? What are the advantages and disadvantages of circular

linked list over singly linked list ? 5

(*b*) Write a function to delete an element X in a doubly linked list. 5

3. (*a*) Write a function to find height of a binary search tree. 5

(*b*) Define the following : 5

(*i*) Complete Binary Tree

(*ii*) Internal Path Length.

4. (*a*) Define a class for implementing Queue using circular array. Write the member functions

to implement *enqueue* and *dequeue* operations on queue. 5

(*b*) Write a function to reverse the contents of a stack using additional stack. 5

5. (*a*) What is hashing ? Using Division Method of Hashing in a table of size 8 slot, put the

following data into the correct slot : 5

6, 36 18, 72. 43.

(*b*) What are self-organizing lists ? For a given sequence CAADABCBB, show the list after

each step using : 5

(*i*) Move to Front and

(*ii*) Count method.

6. (a) Create a B tree of order 4 for the following sequence :   5

         14, 7, 10, 8, 15, 23, 18.

         Show the tree after each step.

    (b) Define the class to implement tri-diagonal matrix of size $n \times n$. Write the member

         functions to store and retrieve elements of tri-diagonal matrix in one-dimensional

         array.   5

7. (a) Write the recursive version of the following function :   5
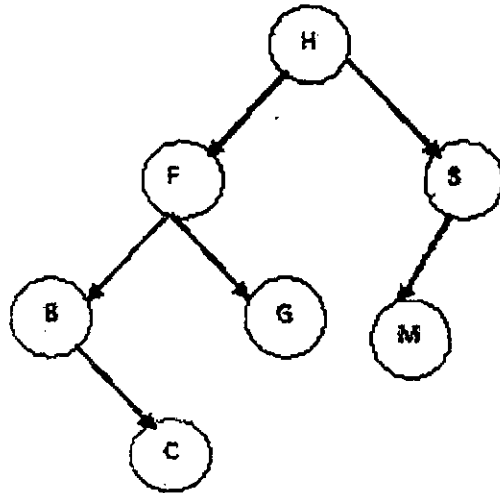
         void

             func(int n)

         {   int i;

                  for (i=1; i<=n; i++)

                      cout <<n*i;

         }

         And give the statement to call this function for the value n=6 in the main.

(*b*)　Consider the following tree :　　　　　　5

Delete nodes with value M, B and F successively using deletion by copying method.