**PSG COLLEGE OF TECHNOLOGY, COIMBATORE – 641 004**

Department of Applied Mathematics and Computational Sciences

I M.Sc (SS/TCS)- C Programming– Assignment

**To be submitted on or before 12.10.2019 (5 pm)**

1. Write a C program to use the functions

1. numpalindrome(int ) that receives a number and checks if the number is a palindrome.The numpalindrome checks if the reverse of the given number is the same.
2. Isvowel( char \*) that receives a string and counts the number of vowels in a String.

2. Explain recursion. What is a Stack frame or an activation record? What kind of information is generally stored in it? Trace the following program by writing the activation record.

int sum(int n) {

if (n < 1) return 0;

return sum(n - 1) \* (n - 1) + n;

}

int main()

{

printf(“%d”, sum(5);

}

3. Write a program to calculate the value for f(4) for the following recursive function definition:

f(0) = 1

f(n) = (f(n -1) \* n) + n

4. Write a recursive C function which calculates the sum function as defined below

sum(0) = 0

sum(n) = sum(n - 1) + n

Write a iterative function for the same

5. Using recursion,

(i) Find the factorial of a number

(ii) Find Greatest Common Divisor (GCD) of two numbers

(iii) To generate Fibonacci sequence

(iv) Reverse ‘n’ characters.

(v) power (x,y) that will compute the *n*th power of *x*, where *x* is a double and *n* is an int

6. Create a user type TIME\_info to store the time in hh:mm:ss.sss format and declare & initialize a variable to current time.

* Write a function to read a time into a TIME\_info variable.
* Write another function to print the time in hh:mm:ss.sss format
* Write a function that converts time values given in seconds (e.g., 12345.67) to time values given in hh:mm:ss.sss (3:25:45.67) format might have the prototype:
  + TIME\_info convertTime( double realTime )
* Write a function for adding two times given in the hh:mm:ss.sss format might have the prototype
  + TIME\_info addTimes(TIME\_info one, TIME\_info two )
* Write a function for subtracting two times given in the hh:mm:ss.sss format might have the prototype
  + TIME\_info subTimes(TIME\_info one, TIME\_info two )
* Write a function normalize having prototype
  + timeinfo\_t normalize( timeinfo\_t originalTime )

that returns a normalized representation for originalTime.

* Now modify your addTimes function, so that it produces output in normalized form.

7. Explain array. A store sells the following 4 products. The products are given in an array “products” of strings and the prices are in an array “prices” of doubles.

**Product Price (Rs)**

MP3 Player 5000

WII 10000

DVD Player 2000

Digital Camera 8000

Write a program to show statistics of total sales as follows:

(a) Define the arrays products and prices and initialize them.

(b) Read the sale quantity of each product into an array.

(c) Print the sale table and shows the total sale including total quantity and total sales.

(d) List which product is sold most and its sale quantity and which product is sold least and its sale quantity.

A possible run may look like:

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The number of MP3 Player sold: 3

The number of WII sold: 4

The number of DVD Player sold: 2

The number of Digital Camera sold: 5

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The statistic of sales is as follows:

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Product Unit Price QTY Total Price

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MP3 Player 5000 3 15000

WII 10000 4 40000

DVD Player 2000 2 4000

Digital Camera 8000 5 40000

Total 14 99000

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Product sold most: Digital Camera 5

Product sold least: DVD Player 2

8. Analyze the following code.

main()  
{  
      static int a[3][3]={1,2,3,4,5,6,7,8,9};  
      int i,j;  
      static \*p[]={a,a+1,a+2};  
            for(i=0;i<3;i++)  
      {  
                  for(j=0;j<3;j++)  
                  printf("%d\t%d\t%d\t%d\n",\*(\*(p+i)+j), \*(\*(j+p)+i),\*(\*(i+p)+j),\*(\*(p+j)+i));  
         }  
}

9. Explain Pointers. How are pointers, arrays, and strings related in C? Explain with an example.

Explain dynamic memory allocation.

Define and differentiate the following. Give examples for each

i) Array and pointer

ii) Array and structure

iii) Structure and Union

iv) Macro and Function

v) String and Character array

10. The collector of MADURAI had ordered a complete revision of the Voters List. He knew that constructing the list of voters is a difficult task, prone to errors. Some voters may have been away on vacation, others may have moved during the enrollment and so on.

To be as accurate as possible, he entrusted the task to three different officials. Each of them was to independently record the list of voters and send it to the collector. In MADURAI, everyone has a ID number and the list would list only the ID numbers of the voters and not their names. The officials were expected to give the list in a file (file1.dat, file2.dat, file3.dat).

On receiving the lists, the Collector realized that there were discrepancies - the three lists were not identical. He decided to go with the majority. That is, he decided to construct the final list including only those ID numbers that appeared in at least 2 out of the 3 lists. For example if the three lists were

23 30 42 57 90

21 23 35 57 90 92

21 23 30 57 90

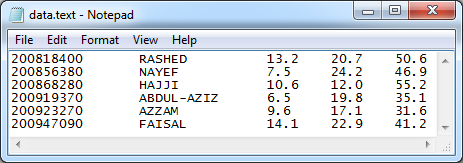
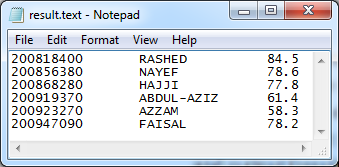
then the final list compiled by the collector would be:

21 23 30 57 90

The ID numbers 35, 42 and 92 which appeared in only one list each do not figure in the final list.

Your task is to help the collector by writing a program that produces the final list from the three given lists.

11. Write a program that reads the inputs (Student ID, Student Name, Scores of Quiz, Lab and Exam) and write into a file. Read the data from the file and then computes and outputs the total score of each of the student, to one digit after the decimal point, in another data file. Get both file names as argument from command line.

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Your Program