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Course Code: MCA-103

Course Name: Programming in C

## Assignment 1

(Based on Unit-I & II)

Q 1. A computer has been programmed to calculate the area of a circle using the formula  $A = \pi r^2$ , given a numeric value for the radius  $r$  as input data. The following steps are required.

1. Read the numeric value for the radius of the circle.
2. Calculate the value of the area using the above formula. This value will be stored, along with the input data, in the computer's memory.
3. Print (display) the values of the radius and the corresponding area.
4. stop.

Each of these steps will require one or more instructions in a computer program. Design a complete working program to calculate area of circle after accepting radius as input from the user. The program should continue till the user wants to keep calculating area for different radius.

Q 2. Read a five-digit number from the user, design a solution to calculate and display the sum of its digits.

Q 3. A C program contains the following declarations:

```
int i,j;  
long ix;  
short s;  
float x;  
double dx;  
char c;
```

Determine the data type of each of the following expressions.

- (a)  $i + c$
- (b)  $s + j$
- (c)  $x + c$
- (d)  $ix + j$
- (e)  $dx + x$
- (f)  $s + c$

Q 4. Design an interactive program that will read in a positive integer value and determine the following:

(i) If the integer is a prime number.

(ii) If the integer is a Fibonacci number.

Design the program in such a manner that it will execute repeatedly, until a zero value is detected for the input quantity. Test the program with several integer values of your choice.

- Q 5. Summarize the rules governing the use of the return statement. Can multiple expressions be included in a return statement? Can multiple return statements be included in a function?
- Q 6. Explain function prototypes? What is their purpose? Where within a program are function prototypes normally placed?
- Q 7. How can a list of strings be stored within a two-dimensional array? How can the individual strings be processed? What library functions are available to simplify string processing?
- Q 8. Design an interactive C program that will encode or decode a line of text. To encode a line of text, proceed as follows.
1. Convert each character, including blank spaces, to its ASCII equivalent.
  2. Generate a positive random integer. Add this integer to the ASCII equivalent of each character. The same random integer will be used for the entire line of text.
  3. Suppose that N1 represents the lowest permissible value in the ASCII code, and N2 represents the highest permissible value. If the number obtained in step 2 above (i.e., the original ASCII equivalent plus the random integer) exceeds N2, then subtract the largest possible multiple of N2 from this number, and add the remainder to N1. Hence the encoded number will always fall between N1 and N2, and will therefore always represent some ASCII character.
  4. Display the characters that correspond to the encoded ASCII values.

The procedure is reversed when decoding a line of text. Be certain, however, that the same random number is used in decoding as was used in encoding.