# RAJARATA UNIVERSITY OF SRI LANKA
# FACULTY OF APPLIED SCIENCES

## B.Sc. (General) Degree in Information and Communication Technology
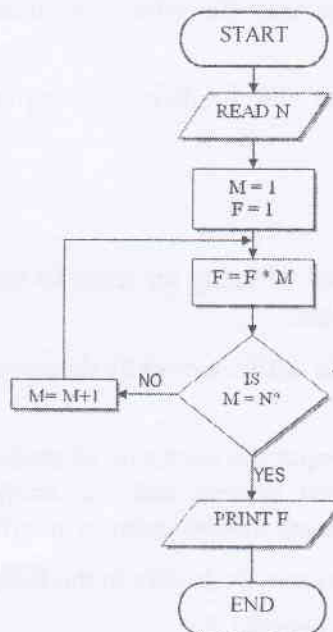### First Year - Semester I Examination – June /July 2018

## ICT 1402 – PRINCIPLES OF PROGRAM DESIGN AND PROGRAMMING
### (Theory Paper)

**Time: Three (03) hours**

**Answer all questions.**

1.

a) Explain three control structures of structured programming and state the benefits of using such structures in writing computer programs. (4 marks)

b) State the techniques of writing algorithms. (2 marks)

c) Write a pseudo algorithm to calculate the running sum of a number series that is terminated with a negative number. (4 marks)

d) Write the output of the following flow chart for a given number N. (4 marks)

```
                    START
                      |
                    READ N
                      |
                    M = 1
                    F = 1
                      |
          +------->  F = F * M
          |           |
          |          / IS \
  M = M+1 |  NO    / M = N? \
          +<------ \        /
                    \      /
                      | YES
                    PRINT F
                      |
                    END
```

e) Explain the advantage of having an Integrated Development Environment (IDE) for writing Computer Programs with compared to an IDE you have used in programming. (6 marks)

2.

a) State the difference between a run time error and a compile time error with examples. (4 marks)

b) Write the output of the following 2 program codes. (6 marks)

```
#include<stdio.h>
int main()

{
        int x=10;
        int y =12;
        int z =15;

        printf("%d",x++);
        printf("%d",++y);
        printf("%d",z+=2);

        return 0;
}
```

```
#include<stdio.h>
int main()

{
        int i=0;
        do{
                printf("Hello, world\n");
                i=i+1;
                if(i=3)
                {
                    break;
                }}while(i<5);
        }
        return 0;
}
```

c) Write a C program that takes the radius of a circle as input and calculate the perimeter and area of the circle. (6 marks)

d) Compare and contrast the implicit and explicit type conversions with suitable examples. (4 marks)

3.

a) Explain the advantages of using an array to store a set of data items compared to using multiple variables. (2 marks)

b) Distinguish between **do while** and **while do** constructs with suitable examples. (4 marks)

c) Suppose you need to input the marks of 10 students for 10 subjects, and calculate the average marks of each student and the average of each subject. Explain your approach on implementing this program in an efficient manner. (6 marks)

d) Suppose a company insures its drivers in the following cases,

    i.   If the driver is married

    ii.  If the driver is unmarried male and above 30 years of age

    iii. If the driver is unmarried, female and above 25 years of age

Write a C program for this company to read age, sex and marital status through the keyboard and output whether the driver is insured or not. (Use logical operators where necessary) (8 marks)

4.

a) State the modes that a file can be operated and explain how they differ from each other. (4 marks)

b) Compare and contrast the two different ways a parameter can be passed to a function in C. (5 marks)

c) What do you mean by a signature of a function? State the components which should be included in the function signature. (4 marks)

d) Write a recursive function to find the Greatest Common Divisor of 2 numbers. (7 marks)

5.

a) Explain the output of the following program. (3 marks)

```
#include<stdio.h>
int main()
{
        int *ptr, b;
        b=sizeof(ptr);
        printf("%d",b);
        return 0;
}
```

b) What is the purpose of using **Dynamic memory allocation** and distinguish in between the malloc() and calloc() functions? (4 marks)

c) **"Structure members cannot be initialized with declaration".** Do you agree with this statement? Discuss. (5 marks)

d) Suppose you want to store bank accounts information of customers which contains the name, account number, account balance.

   i. Propose a suitable structure to represent an account.

   ii. Write a function to add Rs. 100/= to the account balance of all the persons having more than Rs.1000/= in their balance and then print the incremented value of their balance. (8 marks)

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