



**RAJARATA UNIVERSITY OF SRI LANKA  
FACULTY OF APPLIED SCIENCES**

**B.Sc. (General) Degree in Applied Sciences  
First Year - Semester II Examination – September/October 2020**

**COM 1407 – COMPUTER PROGRAMMING**

**Time: Three (03) hours**

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- Answer **ALL** the questions.
  - All the keywords and program codes given in the paper are in standard C language.
  - Use standard C instructions/keywords wherever necessary in answers.
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1. a) What are the steps in the program development life cycle (PDLC)? (4 marks)
- b) What are the differences between interpreters and compilers? (4 marks)
- c) What is the purpose of using *#include* directive? (2 marks)
- d) What does the linker do? Does your compiler do both linking and compiling with just one command, or do you have to enter separate commands? Justify your answer. (4 marks)
- e) What is the difference between *puts()* and *printf()* functions? (2 marks)
- f) Find the error(s) in the following program:

```
int get_1_or_2( void )
{
    int answer = 0;
    while (answer < 1 || answer > 2)
    {
        printf(Enter 1 for Yes, 2 for No);
        scanf( "%f", answer );
    }
    return answer;
}
```

(4 marks)

2 a) Which of the following variable names are valid in C? Explain.

- i. 123variable
- ii. x
- iii. total\_score
- iv. Weight\_in\_#s
- v. one.0
- vi. gross-cost
- vii. RADIUS
- viii. Radius

(4 marks)

b) What is wrong with the following program? Trace out the problematic line(s).

```
1: #include <stdio.h>
2:
3: main()
4: {
5:     printf( "This is a program with a " );
6:     do_it( "problem!");
7:     return 0;
8: }
```

(4 marks)

c) To what value do each of the following expressions evaluate?

- i)  $(1 + 2 * 3)$
- ii)  $10 \% 3 * 3 - (1 + 2)$
- iii)  $((1 + 2) * 3)$
- iv)  $(5 == 5)$

(2 marks)

d) Write a program that calculates the sum of the digits of an integer. For example, the sum of the digits of the number 2155 is  $2 + 1 + 5 + 5$  or 13. The program should accept any arbitrary integer entered by the user.

(4 marks)

e) Write a program to generate all prime numbers between 1 and 50.

*Algorithm: to generate such a series is simply to test each integer  $p$  for divisibility by all integers from 2 through  $p/2$ . If any such integer evenly divides  $p$ , then  $p$  is not a prime; otherwise, it is a prime number.*

(6 marks)

3 a) What is the difference between a function definition and a function prototype?

(2 marks)

b) If a function does not return a value, in what type should it be declared?

(2 marks)

- c) Write a function that receives two numbers as arguments. The function should divide the first number by the second and if the second number is non-zero. (4 marks)

- d) What are the problems in the following code segments? Explain. (4 marks)

```
i.  int x, y;
    int array[10][3];
    void main()
    {
        for ( x = 0; x < 3; x++ )
        for ( y = 0; y < 10; y++ )
        Array[x][y] = 0;
        return 0;
    }
```

```
ii. int array[10];
     int x = 1;
     main()
     { for (x = 1; x <= 10; x++ )
       array[x] = 99;
     }
```

- e) Write the output of the following program?

```
int main (void)
{
    int numbers[10] = { 1, 0, 0, 0, 0, 0, 0, 0, 0, 0 };
    int i, j;
    for ( j = 0; j < 10; j++ )
    for ( i = 0; i < j; ++i )
        numbers[j] += numbers[i];
    for ( j = 0; j < 10; ++j )
        printf ("%i ", numbers[j]);
    printf ("\n");
    return 0;
}
```

(4 marks)

- f) Write a program that takes an integer from the keyboard and extracts and displays each digit of the integer in words in English. Example; If the user types in 932, the program should display 'nine three two'.

Hint: Use *switch... break* statement.

(4 marks)

4. a) Write a program to find the minimum value of an integer array of size *n*.

(4 marks)

- b) Write a C program to read elements in two matrices and multiply them. Two (02) matrices can be multiplied if and only if number of columns in the first matrix is same as number of rows in second matrix. Multiplication of two matrices is defined as

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} e & f \\ g & h \end{bmatrix} = \begin{bmatrix} ae+bg & af+bh \\ ce+dg & cf+dh \end{bmatrix}$$

(6 marks)

- c) How are the elements of an array stored in memory? (4 marks)
- d) Write a function named *addarrays()* that accepts two arrays with same sizes. The function should add each same index pair of elements in the arrays together and store the result in a third array. (6 marks)
5. a) What is a pointer? Why are pointers so important in C? (3 marks)
- b) Declare a pointer type variable named *char\_ptr* of type *char*. (3 marks)
- c) What is the output of the following program? (4 marks)

```
#include <stdio.h>
int main (void)
{
    float floatVals[4] = { 1.2f, -3.7f, 6.2f, 8.55f };
    int i;
    void multiplyBy2 (float array[], int n);
    multiplyBy2 (floatVals, 4);
    for ( i = 0; i < 4; ++i )
        printf ("%0.2f ", floatVals[i]);
    printf ("\n");
    return 0;
}

void multiplyBy2 (float array[], int n)
{ int i;
  for ( i = 0; i < n; ++i )
    array[i] *= 2;
}
```

- d) How is a structure differ from an array in C? (4 marks)
- e) Create a structure containing five strings: *address1*, *address2*, *city*, *state*, and *zip*. Create a typedef called *RECORD* that can be used to create instances of this structure. (6 marks)

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