



# UNIVERSITY OF RUHUNA

## Faculty of Engineering

End-Semester 1, Examination in Engineering, October 2019

Module Number: EE1101    Module Name: Computer Programming I

### Part-B

[1 hour and 30 minutes]

[Answer all questions, each question carries 10 marks]

---

- Q1. a) Write a statement in C programming language to accomplish each of the following:
- A comment to state that a program will calculate the product of three integers.
  - Prompt the user to enter three integers.
  - Define the variables  $x$ ,  $y$  and  $z$  to be of type `int`.
  - Read three integers from the keyboard and store them in the variables  $x$ ,  $y$  and  $z$ .
  - Define the variable `result`, compute the product of the integers in the variables  $x$ ,  $y$  and  $z$ , and use that product to initialize the variable `result`.
  - Print "The product is" followed by the value of the integer variable `result`.

[3 mark]

- b) Using the statements you wrote in section Q1a) , write a complete C program that calculates the product of three integer inputs given by the user. The program should be compiled with standard C compiler without errors.

[2 mark]

- c) Write a program that asks the user to enter the initial velocity and acceleration of an object, and the time that has elapsed, places them in the variables  $u$ ,  $a$ , and  $t$ . Then the final velocity,  $v$ , and distance traversed,  $s$  should be printed, using the following equations.

$$v = u + at$$
$$s = ut + \frac{1}{2}at^2$$

[3 marks]

- d) Write a program that inputs one five-digit number, separates the number into its individual digits using modulus operator and integer division. Then, prints the digits separated from one another by spaces. For example, if the user types in 42139, the program should print 4    2    1    3    9.

[2 marks]

Q2. a) A prime number is any natural number greater than 1 that is divisible only by 1 and by itself. Write a C program that reads an integer and determines whether it is a prime number or not.

[3 marks]

b) Write a program that uses looping to print the following table Q2.b of values. Use the tab escape sequence `\t` in the `printf` statement to separate the columns with tabs.

N	N <sup>2</sup>	N <sup>3</sup>	N <sup>4</sup>
1	1	1	1
2	4	8	16
3	9	27	81
4	16	64	256
5	25	125	625
6	36	216	1296
7	49	343	2401
8	64	512	4096
9	81	729	6561
10	100	1000	10000

Figure Q2.b

[3 marks]

c) Write a C function that takes non-negative integer  $n$  as an input parameter and computes and returns its factorial  $n!$  according to following formula:

$$n! = n \cdot (n - 1) \cdot (n - 2) \cdot \dots \cdot 2 \cdot 1$$

[2 marks]

d) Write a program that estimates the value of the mathematical constant  $e$  by using the formula:

$$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots$$

[2 marks]

Q3. a) Write a program to calculate and print the sum of all multiples of 7 from 1 to 100

[2 Marks]

b) Assume that double precision variables `value1` and `value2` have been declared and `value1` has been initialized to 20.4568.

- i. Declare the variable `dPtr` to be a pointer to an object of type `double`.
- ii. Assign the address of variable `value1` to pointer variable `dPtr`.
- iii. Print the value of the object pointed to by using pointer `dPtr`.
- iv. Assign the value of the object pointed to by pointer `dPtr` to variable `value2`.

[2 marks]

c) If an array of integers, which is defined as

```
int num[150];
```

; contains set of random integers, write C functions that would

- i. return the value of the minimum integer of the array.  
[1 Mark]
- ii. return the value of maximum integer of the array.  
[1 Mark]
- iii. return the index number of the element that contains the maximum integer of the array.  
[1 Mark]
- iv. swap the number at index `j` with the number at index `k` where `j` and `k` are input parameters of the function.  
[1 Mark]
- v. print all integers of the array in ascending order using the above created functions.

[2 Marks]

