THE UNIVERSITY OF TRINIDAD AND TOBAGO

FINAL ASSESSMENT/EXAMINATION

JANUARY – APRIL 2019

Course Code and Title: *PROG1007 Intermediate Computer Programming / PROG1005 Programming II*

Programme: *B.A.Sc. Computer Engineering.*

Date: 29/04/2019 **Time:** 1:00PM - 4:00PM

Duration: three (3) hours

PLEASE READ ALL INSTRUCTIONS CAREFULLY BEFORE YOU BEGIN THIS EXAMINATION

Instructions to Candidates

1. **This paper is worth 64 marks in total.**
2. **All questions do not carry equal marks.**
3. **This paper has 4 pages and 4 questions.**
4. **You are required to answer ALL questions in this paper.**
5. **Complete the examination in pen**
6. **Answer each question on a new page in your answer script**
7. **You are required to return the question paper with the answer script**

Key Examination Protocol

1. Students please note that academic dishonesty (or cheating) includes but is not limited to plagiarism, collusion, falsification, replication, taking unauthorised notes or devices into an examination, obtaining an unauthorised copy of the examination paper, communicating or trying to communicate with another candidate during the examination, and being a party to impersonation in relation to an examination.

2. The above mentioned and any other actions which compromise the integrity of the academic evaluation process will be fully investigated and addressed in accordance with UTT's academic regulations.

3. Please be reminded that speaking without the Invigilator's permission is **NOT** allowed.

Question 1

Total 16 marks

(a) A projectile fired at an angle A with an initial velocity v travels a distance d given by

$$d = v^2/g * \sin(2 * A)$$

where g is the acceleration constant of 9.8 m / sec^2. It stays in motion for a time t given by

$$t = 2 * v/g * \sin(A)$$

and it attains a maximum height h given by

$$h = v^2/g * \sin(A)$$

Write a C program that inputs v and A in function *main* and calls a function *perform_calculations* to determine d, t and h. The values of d, t and h are printed in main.

Question 2

Total 16 marks

Write a C program to perform the following task:

- Input a line of text that contains the characters XX, e.g.

  ```
  I am writing XX final examination.
  ```

- Replace the characters XX with the phrase *PROG1007*.
- Output the modified line of text, e.g.,

  ```
  I am writing PROG1007 final examination.
  ```

Question 3

Total 15 marks

Assume that you have the following data which represents the inventory of a company:

```
34          19.86
8           25.37
92          46.81
12          26.38
```

Line 1 indicates that the company has 34 pieces of Item 1 and each piece sells for a price of $19.86. Your job is to write a C program to enter this data into an appropriate two-dimensional array. Your two-dimensional array must also show in addition to the data above the totals of each item. For example, the resulting two-dimensional array would be

```
34          19.86       675.24
8           25.37       202.96
92          46.81       4306.52
12          26.38       316.56
```

Output the two-dimensional array in the following format:

```
# of Items Unit        Total
            Price

34          19.86       675.24
8           25.37       202.96
92          46.81       4306.52
12          26.38       316.56
```

Question 4

Total 17 marks

An organization has the following data about its employees in a file called ***employee.dat:***

- Employee id (int)
- Date of birth (in format dd/mm/yy)
- Marital Status (M = married, S = single, D = divorced)
- Number of dependents
- Annual salary

The following are some sample data in the file:

```
2753
19/03/96
M
3
83654.59
1592
12/11/88
D
1
68748.37
.
```

The organization wants you to develop a C program, which reads the data from this file and determines the income tax payable by the employee.

To this end, your program should develop a *struct* data type called *employee* which consists of *emp_id, dob, marital_status, num_dependents, salary, annual_tax_payable.* The annual tax payable is 25% of the annual salary minus $3000 for each dependent. Using an array of 150 such employees, read each employee data from the file *employee.dat* and output the employee id and annual tax payable for each employee. Your program must output a report both to screen and to the file ***employeeReport.dat.***

END OF EXAMINATION