STUDENT ID: _____

THE UNIVERSITY OF TRINIDAD AND TOBAGO

DECEMBER 2013 EXAMINATION

ALTERNATE

Course Code and Title: **PROG1004 Computer Programming I**

Programme: Bachelor of Applied of Science in Computer Engineering

Date: **Time:**

Read all instructions carefully before you begin this examination.

Materials supplied:

1. **Question paper**
2. **Answer Booklet**

Instructions to Candidates

1. This Paper comprises six (6) questions.
2. You are required to Answer all questions.
3. Write the answer to each question in the Answer Booklet provided.
4. Write your Student ID at the top of each page of the Answer Booklet as well as on each page of the question paper.
5. The mark for each question is given on the next page as well as at the top of each question.
6. **You must return the question paper along with your answer booklet and other writing paper to the Invigilator at the end of the examination.**

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	MARK
1	/ 8
2	/ 8
3	/ 10
4	/ 12
5	/ 12
6	/ 12
TOTAL	/ 62

QUESTION 1 (8 marks)

The balance in a person's savings account is currently $10,000. Each day, starting from today, he plans to withdraw 2% of the remaining balance. In how many days from today will the balance in the account be $100 or less. Write a C program to answer this question.

QUESTION 2 (8 marks)

What would be the output from the following program:

```
#include <stdio.h>

void main()
{
	int x, y, z = -5;
	x = -4;
	while (x <= 15)
	{
		y = 3;
		while (y < 12)
		{
			z += 4;
			y += 5;
		}
		x += 3;
	}
	printf ("z = %d \n", z);
}
```

QUESTION 3 (10 marks)

The Taylor expansion for determining the sum of the series:

$$x^2 / 2! + x^4 / 4! + x^6 / 6! + \ldots 10 \text{ terms}$$

The output consists of the sum of the series. Apply the expansion to 10 terms in order to determine the sum of the series.

QUESTION 4 (12 MARKS)

A company identifies its departments by department codes. The following are the department codes that are in place:

2 (for Accounting)
5 (for Shipping)
6 (for Stores)
8 (for Security)
9 (for Corporate Office)
10 (for Procurement)
11 (for Maintenance)

The employees have just been given an increase in salary according to the following:

Department Id	% Increase
5, 8, 11	2.5%
2, 10	3.5%
6	4%
9	1.5%

Write a C program which inputs an employee's department code along with his salary. The output from the program should be the employee's new salary which is determined using the schedule above. Your program must use the switch statement.

If an invalid department code is entered, then output the message INVALID DEPARTMENT. In this case, there is no other output.

QUESTION 5 (12 marks)

This question requires you to develop a C program to determine the area bounded by the graph of

$$f(x) = -2x^2 - 7x - 3$$

and the x-axis.

You must first determine the points at which the graph intersects the x-axis and the y-axis. Then produce a sketch of the graph showing the points of intersection with both the x and y axes. Determine and show the exact value of the required area using integration.

Write a program which uses numerical integration to approximate the area bounded by the graph and the x-axis. As discussed in our lectures, this method requires the use of trapezoids to approximate the area. Your procedure should result in an area which is accurate to 6 decimal places.

QUESTION 6 (12 marks)

An organization has 7 departments. The following are the departments and their one-letter codes:

Department	Code
Accounting	A
Marketing	M
Shipping	S
Receiving	R
IT	I
Security	S
Payroll	P

Write a C program to input each department code along with its number of employees, and to output the department code, its number of employees and its percentage of the total number of employees. The format of the output should be:

Department	# of Employees	Percentage
Accounting	…	…
Marketing	…	…
.	.	.
.	.	.
.	.	.