



University of Ruhuna- Faculty of Technology

Bachelor of Engineering Technology Honours

Level 1 (Semester II) Examination, November 2022

Course Unit: TMS1223 Computer Programming Techniques (Theory) Duration: 2 hours

INSTRUCTIONS TO CANDIDATES:

- This paper contains **04 QUESTIONS** in **06 PAGES** including this sheet.
- **ANSWER ALL QUESTIONS.** All questions carry equal marks.
- This is a closed book examination.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- All Examinations are conducted under the rules and regulations of the University.

Q1.

a. State the purpose of using a compiler in computer programming.

(2 marks)

b. Understand the following c program and answer the given questions.

```
/*The distance of a marathon in kilometers*/  
#include <stdio.h>  
int main(void) {  
int miles, yards;  
float kilometers;  
miles = 26;  
yards = 385;  
kilometers = 1.609 * (miles + yards/ 1760.0);  
printf("\nA marathon is %f kilometers.\n\n", kilometers);  
return 0;  
}
```

Code 1

Identify and state examples for the following components in the above code.

- 1) Two different data types
- 2) Two variable names
- 3) Two functions
- 4) Two keywords
- 5) return data type of the main function
- 6) an assignment operator
- 7) a header file
- 8) a format specifier
- 9) a comment
- 10) a variable declaration

(15 marks)

c) If you change the '1760.0' in the above program (*Code 1*) to '1760', Is the output of the program exactly the same as that of the original program? Explain the reason for your answer.

(4 marks)

d) Write the output of the following code fragment.

```
int a, b = 0, c = 0;
a = ++b + ++c;
printf("%d %d %d\n", a, b, c);
a = b++ + c++;
printf("%d %d %d\n", a, b, c);
a = ++b + c++;
printf("%d %d %d\n", a, b, c);
a = b-- + --c;
printf("%d %d %d\n", a, b, c);
```

Code 2

(4 marks)

Q2.

a) Write down **three (3)** main control structures used in C programming language.

(3 Marks)

b) Write down the output of the program given in *code 3* below.

```
#include<stdio.h>
int main () {
int power =0;
while((power+=1) <=10)
printf ("%d\n", power);
}
```

Code 3

(8 marks)

c) Write a program that has the same effect as the above program using a for loop instead of the while loop.

(10 marks)

d) Evaluate the following expressions, assuming $a = 5$, $b = 3.0$, and $c = 4$, and specify whether the result is true or false.

(4 Marks)

- i. $(a \leq 5) \ \&\& \ (b > 2) \ || \ (c == 6)$
- ii. $(a == 1.3) \ || \ (b > 2.0) \ \&\& \ (c > 2.0)$

Q3.

a) Explain the key difference between arrays and pointers. (2 marks)

b) State **two (2)** advantages of using pointers in programming. (2 marks)

c) Write down the output of the program given in *code 3* below.

```
#include <stdio.h>
int main () {
    int x, y, *ptr;
    x = 10;
    ptr = &x;
    y = *ptr;
    printf ("%d is stored in location %u \n", x, &x);
    printf ("%d is stored in location %u \n", *&x, &x);
    printf ("%d is stored in location %u \n", *ptr, ptr);
    printf ("%d is stored in location %u \n", y, &*ptr);
    printf ("%u is stored in location %u \n", ptr, &ptr);
    printf ("%d is stored in location %u \n", y, &y);
    *ptr = 25;
    printf ("\nNow x = %d \n", x);
}
```

Code 4

Consider the memory addresses of x, y and z as follows.

Address of x: 4908

Address of y: 4904

Address of ptr: 4900

(13 marks)

d) Consider i and j are integer values and p and q are pointers to i and j values respectively.

i) Write declaration and initialization statements for i, j, p and q variables. (Assign any preferred values for i and j)

(4 marks)

ii) Select which of the following assignment expressions are **not legal**?

$p = \&\&i;$

$*q = \&j;$

$*p = *p+2;$

$p = p + q;$

(4 marks)

Q4.

a) Explain **two (2)** advantages of **sorting** with applications?

(2 marks)

b) Consider the following array of int values.

[22, 11, 34, -5, 3, 40, 9, 16, 6]

Write the contents of the array after 3 passes of the outermost loop of each of the following sorting algorithms.

i) Bubble sort

(ii) Insertion sort

(iii) Selection sort

(12 marks)

c) Explain the need of arrays for data structure using an example.

(3 marks)

d) Write down the **function headers** for each of the following function

- i. Function **hypotenus** that takes double-precious floating-point arguments called **side1** and **side2**, and returns a double-precision floating point value.
- ii. Function **smallest** that takes three integers, x,y,z and returns an integer.
- iii. Function **instructions** that does not receive any arguments and does not return a value (note: such functions are commonly used to display instructions to a user)
- iv. Function **inToFloat** that takes an integer argument, **number**, and returns a floating point result.

(8 marks)

..... **End of the Paper**.....