University of Ruhuna- Faculty of Technology

Bachelor of Engineering Technology Honours Degree
Level 1 (Semester II) Examination, November/December 2025
Academic year 2023/2024

Course Unit: TMS1242 Computer Programming Techniques **Duration: 2 hours**

INSTRUCTIONS TO CANDIDATES:

- This paper contains **04 QUESTIONS** in **05 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.

Question 1

A vehicle parking system automatically calculates parking fees based on the type of vehicle and the number of hours parked.

The rules used by the system are as follows,

- **Car** → Rs. 100 per hour
- **Motorbike** → Rs. 50 per hour
- **Electric Vehicle (EV)** → First **2 hours free**, and **Rs. 80 per additional hour**

Using this scenario, answer the following questions.

a) List any **three (03)** decision-making statements used in C programming.

b) Draw a **flowchart** that represents the parking fee calculation process of the above scenario.

c) Write a **C program** to calculate and display the parking fee for a given vehicle type and number of hours parked.

Assume the values are entered by the user, and the vehicle type should be entered as,

- 'C' or 'c' for Car
- 'M' or 'm' for Motorbike
- 'E' or 'e' for Electric Vehicle

d) Modify your program in part (c), accordingly check whether the entered number of hours is **0 or a negative value**. Explain why this validation is necessary and describe what output the program should display in such a case.

Question 2

a) List any **three (03)** types of loop structures available in C programming.

b) Select the **most suitable loop structure** in C for each of the following real-world scenarios.

i. A coffee machine keeps serving drinks **until** the customer selects **"Exit"** on the screen.

ii. A countdown timer displays numbers from **10 to 1** before starting a game.

iii. A password prompt must appear **at least once** and then continue **only if the password is incorrect**.

c) Kasun is developing a C program to print numbers from **1 to 10**, skipping the number **5**.

He wrote the following code, but the output is not what he expected.

```
#include <stdio.h>
int main (){
    int i = 1;
    while (i <= 10) {
        if (i == 5) {
            continue;
        }
        printf("%d\n", i);
        i++;
    }
    return 0;
}
```

i. Write the expected **output** of the above program and **explain the reason for that output**.

ii. Identify the error in the program and write the **correct C program** to print numbers from 1 to 10 while skipping 5.

d) Two programmers have written different solutions to **search for a student ID number** in a list of student IDs.

- **Program X** uses a for loop
- **Program Y** uses a while loop with a break statement when the ID is found

Assume the total number of students is known before the loop begins.

Evaluate which program is **more efficient and readable** for searching for the ID. Provide **two (02) reasons** to support your decision.

Question 3

The Department of Engineering Technology is developing a small computer program to store student marks and login details. You are asked to help with developing this program using **arrays** in C programming.

Answer all the questions below.

a)

i. What is **an array in** C programming? Write your answer with **one (01)** simple example.

ii. Explain how to **declare** and **store values** in both one-dimensional arrays and two-dimensional arrays using one example for each.

b) Apply your understanding of arrays in C programming to write a complete program that inputs 5 marks from the user, stores the marks in an array, and then displays all the marks entered by the user.

c) Understand the following program and **explain what happens in this program step-by-step**.

```
#include <stdio.h>

int main() {
    int a[5], i;
    int p = 0, n = 0, z = 0;

    printf("Enter 5 numbers:\n");
    for(i = 0; i < 5; i++) {
        scanf("%d", &a[i]);
        if(a[i] > 0) p++;
        else if(a[i] < 0) n++;
        else z++;
    }

    printf("Positive: %d\nNegative: %d\nZeros: %d\n", p, n, z);
    return 0;
}
```

d) Consider the following code segment,

```
int a[4] = {10, 20, 30, 40};
printf("%d", a[4]);
```

i. What will happen when this code executes? Explain your answer.

ii. Correct the code to print the last element of the array properly.

Question 4

A small program is needed to store and analyze the water usage values of students in a hostel. You are asked to help by using **functions and pointers** in C programming.

a) What is a pointer? Write down a pointer declaration and initialization with a simple example, clearly showing how the pointer accesses the variable value.

b) Write a function prototype for each of the following,

i. A function that receives an integer pointer and prints the values stored in that memory

ii. A function that receives an integer pointer and the number of elements, and returns the total of those values

(Only write the function prototypes and no need of full code)

c) Develop a C program that,

- Asks the user to enter **two integers**
- Uses a **function named add()** to add the two numbers and return the result
- Uses a **function named subtract()** to subtract the second number from the first number and return the result
- Display the results of both the addition and subtraction on the screen.

d) State **two (02) advantages** of using functions in a program instead of writing the entire code inside the main() function.

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