University of Kelaniya – Sri Lanka
Centre for Distance and Continuing Education
Bachelor of Science (External) First Year First Semester - 2023
2024 – December
Faculty of Science
Fundamentals of Programming
COSC 16523/COST 16523/63COSC 16523(R)/COST 16523(R)

No of Questions: Four (04)   No. of pages: Four (04)   Time: Two (02) Hours

Answer ALL questions

1.

a.

   i. What is an algorithm?

(10 Marks)

  ii. List the types of Programming Languages.

(10 Marks)

  iii. Explain two differences between the Interpreter and the Compiler.

(20 Marks)

  iv. Write a pseudo code and draw a flowchart to calculate an employee's total pay based on the following conditions:
If the number of hours worked exceeds 40, the employee earns overtime pay.
- Overtime pay is calculated at 1.5 times the hourly rate for the hours worked beyond 40.
- Regular pay is calculated as 40 hours multiplied by the hourly rate.
    Formula:
    For hours > 40: Pay=(40×Rate) + (Overtime Hours×Rate×1.5)
    For hours ≤ 40:   Pay= Hours × Rate

The program should:
- Read the number of hours worked and the hourly rate.
- Use the above formula to calculate the total pay.
- Print the calculated pay.

(30 Marks)

  v. What are the features of C Programming?

(10 Marks)

b. What is wrong with each of the following C identifiers? Suggest a fixed version for each.
   i. my value
  ii. here:there
  iii. 4ever
  iv. main

(20 Marks)

2.

   a. Write a C program to print the following message exactly as shown using a single printf line, including the double quotes.

      i.   Welcome to "C Programming"!

      ii.   Error Log:
           ================================
           Error Code: 404 ?

                                                                  (20 Marks)

   b. Convert the following mathematical expressions into valid C expressions:

      i. $A = \dfrac{B+C}{D}$

      ii. $X = Y^2 + 2Z$

      iii. $F = \dfrac{G}{H+I} + J$

      iv. $K = L \times (M + N)^3$

                                                                  (20 Marks)

   c. State whether each of the following statements is true or false. If your answer is false, give reasons.

      i.   C considers the variables first and First to be identical.

      ii. C assignment operators are evaluated from left to right.

      iii. The expression (p>q && m<n) is true if p>q is true or n<m is false.

                                                                  (20 Marks)

   d.

      i.   What is a Constant?

                                                                    (10 Marks)

      ii. How do you declare a constant in C programming?

                                                                    (15 Marks)

   e. What is meant by operators and operands in expressions?

                                                                    (15 Marks)

3.

   a. Given the following C expressions, predict the result for each when num1 = 20 and num2 = 4:

      i.   result = num1 + num2 * 2;

      ii.   result = (num1 - num2) / 3;

      iii. result = num1 % num2 + 3 * 2;

      iv. result = num1 * num2 / 2 + num1 % num2;

                                                                  (25 Marks)

b.

    i. What output will following code produce, when embedded in a complete program?

```
int x = 2;
printf("Start\n");
if (x <= 3)
        if (x != 0)
                printf("Hello from the second if.\n");
else
        printf("Hello from the else.\n");
printf("End\n");

if (x > 3)
        printf("Start again\n");
if (x != 0)
        printf("Hello from the second if.\n");
else
        printf("Hello from the else.\n");
printf("End again\n");
```

(25 Marks)

c. Write a simple C program that prompts the user to input two integers and then prints their sum.

(20 Marks)

d. Explain what will be printed by the following code.

```
#include <stdio.h>
int main() {
  int x = 10, y = 5,z;
  z=--x + y++;
  if (x > 5 && y> 5) {
    printf("Condition met\n");
  }
  printf("Value of z: %d\n", z);
    return 0;
  }
```

(20 Marks)

e. What is the difference between while and do-while loops.

(10 Marks)

4.

a. What will be the output of the following switch statement?

```
int num = 2;
switch (num) {
    case 1:
        printf("One\n");
```

```
        break;
    case 2:
        printf("Two\n");
    case 3:
        printf("Three\n");
        break;
    default:
        printf("Invalid number\n");
}
```

(20 Marks)

b.

    i. Write a C program that prints the numbers from 1 to 10 using a for loop.

(15 Marks)

    ii. What is the purpose of the break keyword?

(10 Marks)

c. Consider the following code segment:

```
int i = 0, x = 5;
while (i < 10) {
    if (i % 2 == 0) {
        x = x + 2;
        printf("%d\n", x);
    }
    i++;
}
printf("x=%d\n", x);
```

    i.   What is the number of times that the while loop would execute?
    ii.   Give the output of the code segment.
    iii. Replace the while loop in the above code segment using a for loop.

(30 Marks)

d.

i. Explain how a switch statement works in C. What are the advantages of using a switch statement over a series of if-else if-else statements?

(10 Marks)

    iii. What is the role of the default keyword in a switch statement, and when should it be used?

(10 Marks)

    iv. What is a loop control variable, and why is it important to manage it correctly in loops?

(05 Marks)

*** END OF PAPER ****