

PAN AFRICA CHRISTIAN UNIVERSITY

DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY

END OF SEMESTER EXAMINATION

DEPARTMENT: COMPUTING AND INFORMATION TECHNOLOGY

COURSE CODE: DICT0113

COURSE TITLE: PRINCIPLES OF PROGRAMMING AND ALGORITHMS

CAMPUS: ROYSAMBU

EXAM DATE: TEUSDAY 2ND APRIL ,2025

TIME: 2:00PM -5:00PM

INSTRUCTIONS

- This exam script has **TWO (2)** sections.
- Read all questions carefully before attempting.
- Answer All questions in Section **A** and any other Three questions in Section **B**.
- Write only your **student number** on the answer booklet provided.

SECTION A

(Answer ALL questions in this section)

Question 1:

- a) Part of the syntax of a C program is the pre-processor directives. State the role the pre-processor directives play in C. **(1 mark)**
- b) Given $a = 11$, $b = 6$, $c = 0$, $d = 7$, $e = 5$, solve the following expression:
 $a + 2 > b \ || \ c \ \&\& \ a == -d * a - 2 < e$ **(2 marks)**
- c) Sarah is a software developer working on a large-scale application. She needs to choose between a compiler and an interpreter to translate her code into machine language. Explain how each of the following program translators would function in Sarah's case:
(4 marks)
- i. Compiler
 - ii. Interpreter
- d) The following are variable names used by a student in a C language program.
- i. Myfirst Program
 - ii. Summation
 - iii. Switch

State the validity of each of the variables. **(3 marks)**

SECTION B

(Answer any THREE (3) questions in this section)

Question 2:

- a) Explain the difference between $++x$ and $x++$? **(3 marks)**
- b) A bank is developing a system to store customer data, including account balance, account number, and customer name. Suggest the most appropriate

data types in C for each of the following:

(3 marks)

- i. Account number
 - ii. Account balance
 - iii. Customer name
- c) Strings are always enclosed by double quotes. A programmer can use the following declarations while writing a program

```
char string [20] = "fresh2refresh"; (or)
```

```
char string [] = "fresh2refresh";
```

Differentiate the two declarations.

(4 marks)

Question 3:

- a) A novice programmer writes the following C program but encounters compilation errors:

```
#include <stdio.h>

int main() {

    int number;

    printf("Enter a number: ");

    scanf("%d", number);

    printf("You entered: %d", number);

    return 0;

}
```

- i. Identify two errors in this program. **(2 marks)**
- ii. Rewrite the program with the necessary corrections. **(4 marks)**

- b) Computer programming have evolved over time. Discuss two paradigms that have been part of this evolution. **(4 marks)**

Question 4:

- a) Briefly comment each of the following lines of code:
marks)

(5)

- i. `int x = 2;`
- ii. `int*p;`
- iii. `p = &x;`
- iv. `*p = 4;`
- v. `area = 3.142*radius*radius;`

- b) A company wants a C program to calculate employee bonuses using the formula:

$$\text{Bonus} = \text{salary} \times 10\% + 500$$

The programmer writes the following formula:

$$\text{bonus} = \text{salary} * 10 / 100 + 500;$$

- i. Explain the logical error in this formula.
marks)
- ii. Rewrite the correct formula.
marks)

(3)

(2)

Question 5:

Kevin, a programming student, is analyzing the following C language program to understand how arrays and loops work.

```
#include <stdio.h>

int main()
{
    int Myarray[4] = {10, 20, 30, 40};
    int i, j;
```

```
for (j = 3; j >= 0; j--)  
{  
    printf("Element[%d] = %d\n", j, Myarray[j]);  
}  
return 0;  
}
```

- i. State the output of this program when executed? (2 marks)
- ii. Describe how for loop iterates through the array. (4 marks)
- iii. Modify the program so that it prints the array elements in ascending order instead of descending order. (4 marks)

Question 6:

- a) Algorithms are step-by-step procedures designed to execute instructions in a specific order to achieve the desired output. Write a pseudocode for the following algorithm. **(5 marks)**

Step 1: START

Step 2: Declare integer variables num1, num2, and result.

Step 3: Read values num1 and num2.

Step 4: add the value and store it to the result variable. result←num1+num2

Step 5: print result

Step 6: STOP

- b) Explain how decision trees can be used to represent algorithms in decision-making processes. **(5 marks)**

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