

PAN AFRICA CHRISTIAN UNIVERSITY

DIPLOMA IN INFORMATION, COMMUNICATION AND TECHNOLOGY

END OF SEMESTER EXAMINATION

DEPARTMENT: COMPUTING AND INFORMATION TECHNOLOGY
COURSE CODE: DICT0113
COURSE TITLE: PRINCIPLES OF PROGRAMMING AND ALGORITHMS
CAMPUS: ROYSAMBU
EXAM DATE: MONDAY 2nd AUGUST ,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) Define syntax and semantics in the context of programming languages. **(2 marks)**
- b) Algorithms play a crucial role in creating efficient programs. Identify two key characteristics of a well-designed algorithm. **(2 marks)**

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- c) Describe the fundamental elements that constitute a programming environment and their significance in software development. **(3 marks)**
- d) Primitive data types serve as the foundational building blocks in programming. List three commonly used primitive data types in programming languages. **(3 marks)**

SECTION B

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

Question 2:

- a) Programming paradigms define the structural and logical approach used in software development. Briefly discuss the following paradigms: **(4 marks)**
 - i. Structured Programming
 - ii. Object-Oriented Programming
- b) Using a C program example, illustrate the implementation of a nested if...else statement, explaining its usage and benefits. **(6 marks)**

Question 3

- a) Develop a C program using a while loop to systematically generate and display all odd numbers in the range of 0 to 50. **(4 marks)**
- b) Version control systems are essential in large-scale software development for tracking changes, managing code history, and restoring previous versions when needed. Briefly discuss the three main types of version control systems. **(6 marks)**

Question 4

- a) Compilation is the process of converting high-level source code into machine-executable code. Explain the three primary stages involved in program compilation. **(6 marks)**
- b) Identify and correct errors in the following C program: **(4 marks)**

```
#include<stdio>

int main () {

    int a = 5;

    switch (a) {

        case 1:

            printf("First");

        case 2:

            printf("Second");

        case 3 + 2:

            printf("Third");

        case 5:

            printf("Final");
```

```
        break;  
    }  
    return 0;  
}
```

Question 5

a) Develop a C program that accepts a student's marks as input and calculates their grade using the following grading system: **(5 marks)**

- Percentage $\geq 80 \rightarrow$ Grade 'A'
- Percentage $\geq 70 \rightarrow$ Grade 'B'
- Percentage $\geq 60 \rightarrow$ Grade 'C'
- Percentage $\geq 50 \rightarrow$ Grade 'D'
- Percentage $< 50 \rightarrow$ Grade 'F'

b) Provide brief comments on the function and significance of each of the following lines of C code: **(5 marks)**

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

Question 6

a) Using examples, discuss the key components of a function in programming and their roles in program execution. **(6 marks)**

b) Develop a C program that defines a function to determine whether a number is prime. **(4 marks)**