National University of Computer and Emerging Sciences 

**Laboratory Manual**

*for*

**Programming Fundamentals**

**(CL-118)**

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Department of Computer Science

FAST-NU, Lahore, Pakistan

FAST-NU, Lahore Programming Fundamentals (CL-118) Lab Manual

**Lab Manual**

**Objectives**

The objectives of this lab are to cover the following:

● What is a Pseudocode?

● Why it is used?

● What are the main steps in writing a Pseudocode?

**Important Notes**

● Be aware that you will be asked to write a pseudocode, not syntactic code.

● You will be writing pseudocode for sequential statements and conditional statements.

● Indent your program so that statements inside a block can be distinguished from another block

**Pseudo code:**

Pseudo code can be broken down into five components.

● Variables

● Assignment

● Input/output

● DataTypes

● Selection

● Repetition

A **variable**has a name, a data type, and a value. There is a location in memory associated with each variable. A variable can be called anything or be given any name. It is considered good practice to use variable names that are relevant to the task at hand.

**Assignment** is the physical act of placing a value into a variable. Assignment can be shown using set = 5; set = num + set; The left side is the variable a value is being stored in and the right side is where the variable is being accessed. When a variable is assigned a value, the old value is written over with the new value so the old value is gone. x = 5 does not mean that x is equal to 5; it means set the variable x to have the value 5. Give x the value 5, make x equal to 5.

A **data type** is a type of data. When computer programs store data in variables, each variable must be assigned a specific data type. Some common data types include integers, floating point numbers, characters, strings, and arrays.

Example: ‘*Declare Integer r’* means r is a variable with type integer and can only be assigned with numbers without decimal point. Similarly, ‘*Declare String r’* means r variable can be assigned a phrase/word that contains alphanumeric characters only.

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| **Data Type** | **Represents** | **Examples** |
| integer | whole numbers | -5, 0, 123 |
| floating point **(real)** | fractional numbers | -87.5, 0.0, 3.14159 |
| string | A sequence of characters | "Hello world!" |

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| --- | --- | --- |
| Boolean | logical true or false | true, false |
| nothing | no data | null |

**Input / Output** both deal with an outside source (can be a user or another program) receiving or giving information. An example would be assuming a fast food restaurant is a program. A driver (user) would submit their order for a burger and fries (input), they would then drive to the side window and pick up their ordered meal (output.)

● Output – Write / display / print

● Input – Read / get / input

**Selection** construct allows for a choice between performing an action and skipping it. It is our conditional statements.

**Repetition** is a construct that allows instructions to be executed multiple times (IE repeated).

In a repetition problem

– Count is initialized – Tested – incremented

**Sample Pseudocode**

DECLARE Integer R, Real A

INPUT R

A = 3.1415\*R\*R

Print A

**Problems**

1. **An algorithm to find the greater number between two numbers.**

Sample Output:

Enter Number 1: 20

Enter Number 2: 10

Output: 20 is greater than 10

1. **An algorithm to tell if a given number is even or odd.**

Sample Output:

Enter the number: 2

The number you entered is even.

Enter the number: 3

The number you entered is odd.

1. **An algorithm that takes a number of weekdays and displays the name of the day. For example, if the user enters 1 it displays Friday.**

Sample Output:

Enter the number of a weekday: 2

The day is Saturday.

Enter the number of a weekday: 3

The day is Sunday.

1. **An algorithm that inputs a character like a,b,c, and displays whether it is a vowel or not.**

Sample Output:

Enter any character: a

You entered a vowel a.

Enter any character: b

You entered a consonant b.

1. **Write an algorithm to calculates and print the number of days in a month.**

Sample Output:

Enter the month: 9

The number of days in this month is 30.

Enter the month: 3

The number of days in this month is 31.

**Pseudocode Language**

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| --- | --- |
| **Command** | **Purpose** |
| **DECLARE** {List  of names} | Create a list of variables |

|  |  |
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| **Expressions** | Expression can be arithmetic or  logical but each expressions evaluates  to a number with logical expressions  having value of 0 if false and 1 if true.  Expressions can be formed using  variables, numbers, arithmetic  operators {+, -, \*, /}, and relational  operators {<, <=, >, >=, !=, ==} |
| **Assignment**  **operation =** | Operation to assign a value to a  variable |
| **INPUT** {List of  names} | Read multiple values from the input  device and place these values at  locations specified by the variable  names |
| **PRINT** {List of  names} | Display the values of multiple  variables on the output device in the  given order. |
| **IF (E1)-THEN ---**  **ENDIF** | Conditional execution of instructions  between THEN and END IF.  Instructions will be executed only if  the value of expression is nonzero. |
| **IF (E1) ---THEN**  **ELSE---ENDIF** | Conditional execution of instructions  between THEN and ELSE or ELSE  and END IF. Instructions written  between THEN and ELSE will be  executed if the value of expression is  non-zero and the instructions between  ELSE and ENDIF will be executed  otherwise |