BSCCSIT

Lab Manual

FOR 1ST SEM

Computer Science and Information Technology (CSC. 109)

SOCH COLLEGE OF IT

(Affiliated to TribhuvanUniversity)

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Contents

1. Problem Solving Techniques:

The process of working through details of a problem to reach a solution. There are three approaches to problem solving:

1. **Algorithm**
2. **Flowchart**
3. **Pseudo Code**

1. **Algorithm:** The algorithm is a step-by-step procedure to be followed in solving a problem. It provides a scheme to solve a particular problem in finite number of unambiguous steps. It helps in implementing the solution of a problem using any of the programming languages. In order to qualify as an algorithm, a sequence of instructions must possess the following characteristics:

   - **Definiteness**: Instructions must be precise and unambiguous i.e. each and every instruction should be clear and should have only one meaning.
   - **Finiteness**: Not even a single instruction must be repeated infinitely. i.e., each instruction should be performed in finite time.
   - **Termination**: After the algorithm gets executed, the user should get the desired result

Key features of an algorithm:

Any algorithm has a finite number of steps and some steps may involve decision making, repetition. Broadly speaking, an algorithm exhibits three key features that can be given as:

Sequence: Sequence means that each step of the algorithm is executed in the specified order.

Decision: Decision statements are used when the outcome of the process depends on some condition.

Repetition: Repetition which involves executing one or more steps for a number of times can be implemented using constructs like the while, do-while and for loops. These loops executed one or more steps until some condition is true.

Example: To compute the Area of Rectangle

ALGM: AREA_of_RECTANGLE [This algorithm takes length and breadth, the sides of the rectangle as input and computes the area of rectangle. Finally, it prints the area of rectangle]

STEPS:

Step 1:[Initialize]

Start

Step 2: [Input the sides of Rectangle]

Read length, breadth

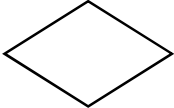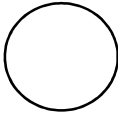Step 3:[Compute the area of rectangle]

Area=length*breadth

Step 4:[Display the Area]

Print Area

Step 5: [Finished]

Stop

2. **Flowcharts:** A flowchart is a graphical or symbolic representation of an algorithm. They are basically used to design and develop complex programs to help the users to visualize the logic of the program so that they can gain a better understanding of the program and find flaws, bottlenecks, and other less-obvious features within it. Basically, a flowchart depicts the "**flow**" of a program. The following table shows the symbols used in flowchart along with its descriptions.

Symbol	Name	Description
	oval	Represents the terminal point
	Rectangle	Represents the process steps defined in algorithm
	Parallelogram	Indicate the reading Operation used for input/output or data or information from/to any device
	Diamond	indicates the decisions (questions) and consequently the branch points or the paths to be followed based on the result of the question
	Small circle	Shows the continuation from one point in the process flow to another
	Predefined Process	Indicates Subroutines
	Hexagon	Represents Looping structures
	Arrows	Shows the flowchart direction and connects the various flow chart symbols

Advantages of Flowcharts:

- A flowchart is a diagrammatic representation that illustrates the sequence of steps that must be performed to solve a problem. They are usually drawn in the early stages of formulating computer solutions to facilitate communication between programmers and business people.
- Flowcharts help programmers to understand the logic of complicated and lengthy problems.
- They help to analyses the problem in a more effective manner
- Flowchart can be used to debug programs that have error(s).

Limitations of using Flowcharts:

- Drawing flowcharts is a laborious and a time consuming activity.
- Flowchart of a complex program becomes, complex and clumsy. At times, a little bit of alteration in the solution may require complete re-drawing of the flowchart
- Essentials of what is done may get lost in the technical details of how it is done.
- There are no well-defined standards that limits the details that must be incorporated in a flowchart

E.g.: Compute the Area of Rectangle
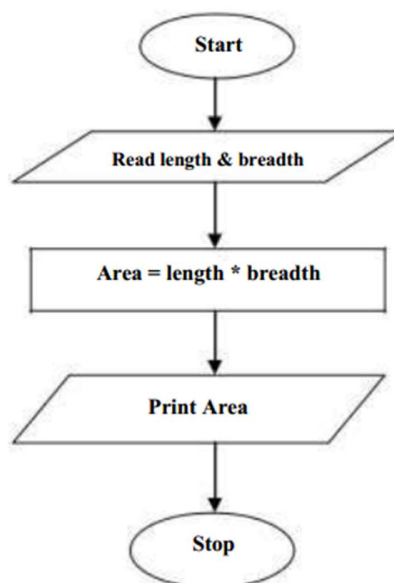
3. **Pseudocode:**

It is a form of structured English that describes algorithms. It facilitates the designers to focus on the logic of the algorithm without getting bogged down by the details of language syntax. Pseudocode is a compact and informal high-level description of an algorithm that uses the structural conventions of a programming language. It is meant for human reading rather than machine reading, so it omits the details that are not essential for humans. Such details include keywords, variable declarations, system-specific code and subroutines. There are no standards defined for writing a pseudocode because it is not an executable program. Flowcharts can be considered as a graphical alternative to pseudocode, but are more spacious on paper.

E.g.: To compute the area of Rectangle

Begin

Input length, breadth
Area=length*breadth
Print Area
End

Experiment No. 1: Design and develop a flowchart or an algorithm that takes three coefficients (*a*, *b*, and *c*) of a Quadratic equation (*a*x2+*b*x+*c*=0) as input and compute all possible roots. Implement a C program for the developed flowchart/algorithm and execute the same to output the possible roots for a given set of coefficients with appropriate messages.

Algorithm: *To find and output all the roots of a given quadratic equation for non zerocoefficients*

Step 1: [Start]

Begin
Step 2: [Input the co-efficients of the quadratic equation

    Read a,b,c
Step 3:[Check for the non-zero coefficient of a]

    If a = 0 then print "Invalid input", go to step 2

Step 4: [Find the value of disc]

    disc = b * b – 4 *a * c
Step 5: [Find the type and the values of roots of a given quadratic equation]

    If (disc = 0) then

    Print "The roots are equal" root1 = root2 = -b / 2.0*a Go to step 6
    Else If (disc > 0) then
    Print "The roots are real and distinct"
    root1 = (-b + sqrt(disc)) / 2.0*a
    root2 = (-b - sqrt(disc)) / 2.0*a
    Go to step 6
    else
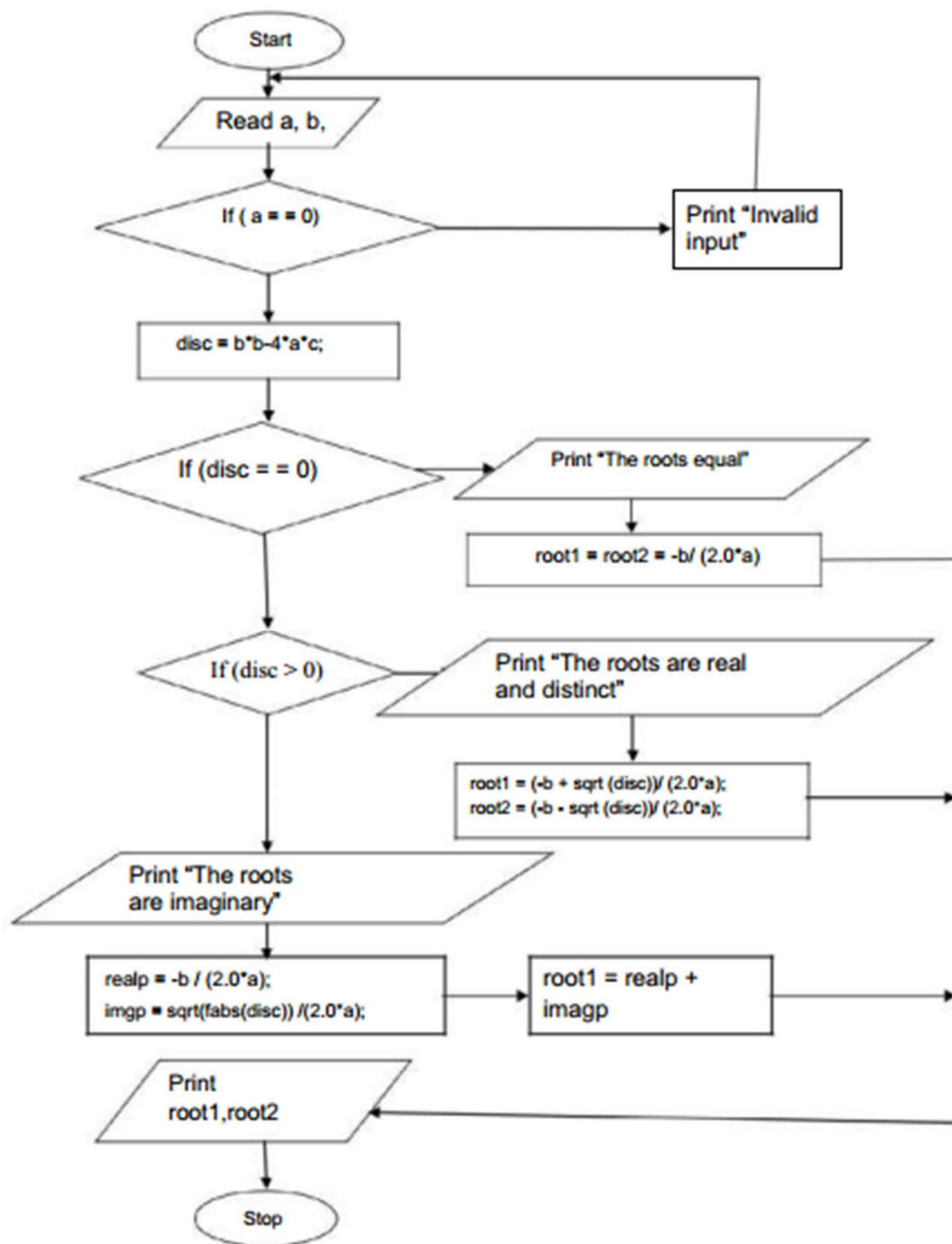   Print "The roots are imaginary"

    root1 = -b / 2.0*a
    root2 = sqrt(fabs(disc)) / 2.0*a

Step 6: [Output]

    Print root1, root2
Step 7: [Stop]

Flow Chart

```
                    ┌─────────┐
                    │  Start  │
                    └────┬────┘
                         │
              ┌──────────▼──────────┐
              /    Read a, b,       /
              └──────────┬──────────┘
                         │
                    ◇────▼────◇              ┌──────────────┐
                   /           \             │ Print "Invalid│
                  ◇  If ( a = = 0) ◇─────────▶│ input"       │
                   \           /             └──────────────┘
                    ◇────┬────◇
                         │
              ┌──────────▼──────────┐
              │  disc = b*b-4*a*c;  │
              └──────────┬──────────┘
                         │
                    ◇────▼────◇            ┌────────────────────────┐
                   /           \           / Print "The roots equal" /
                  ◇ If (disc = = 0) ◇──────▶└───────────┬────────────┘
                   \           /                        │
                    ◇────┬────◇           ┌─────────────▼──────────────┐
                         │                │ root1 = root2 = -b/ (2.0*a) │
                         │                └────────────────────────────┘
                    ◇────▼────◇            ┌────────────────────────────┐
                   /           \           / Print "The roots are real  /
                  ◇ If (disc > 0) ◇────────▶/   and distinct"           /
                   \           /           └────────────┬───────────────┘
                    ◇────┬────◇                         │
                         │             ┌────────────────▼─────────────────┐
                         │             │ root1 = (-b + sqrt (disc))/ (2.0*a);│
                         │             │ root2 = (-b - sqrt (disc))/ (2.0*a);│
                         │             └──────────────────────────────────┘
        ┌────────────────▼──────────────┐
        / Print "The roots              /
        /  are imaginary"              /
        └────────────────┬──────────────┘
                         │
   ┌─────────────────────▼──────────┐      ┌────────────────┐
   │ realp = -b / (2.0*a);          │      │ root1 = realp +│
   │ imgp = sqrt(fabs(disc)) /(2.0*a);│─────▶│ imagp          │
   └─────────────────────┬──────────┘      └────────────────┘
                         │
              ┌──────────▼──────────┐
              / Print               /
              / root1,root2        /
              └──────────┬──────────┘
                         │
                    ┌────▼────┐
                    │  Stop   │
                    └─────────┘
```

2. MS- Word

Topics to be covered

   i.   Personal Letter
  ii.   Company Letter Head
 iii.   News Letter/Research Paper
 iv.   Resume/ Curriculum Vitae
  v.   Cover Page of a Project Report
 vi.   Table of contents & Table of Figures
vii.   Review documents & Track changes

Eg: Draw a Functional block diagram of Computer, CPU, Buses, Mother Board, Chip sets and properly label it with caption using MS-Word.

3. MS- PowerPoint

Topics to be covered

   i.   Preparing Presentation Slide
           Eg: Prepare a Presentation Slid Listing computers hardware peripheral's and commonly used Software
  ii.   Embed video on Presentation Slide
 iii.   Header and footer in Presentation document
 iv.   Auto Data
  v.   Create a FB cover video using MS Power Point.

4. MS- Excel (Spreadsheet)

Use of Vlookup Functions

Use of various formula in xls (Addition, Subtraction, division, Concatenates, Summation, Mean, Replace, Count, Max, Mini，Vlookup etc)

5. VIVA-Questions

What is a computer system?

What is hardware and software?

What is integrated circuit? Explain.

What is the function of cpu?

What is a chip set?

What is system bus?

What are input and output devices?

What is an operating system?

What is an algorithm?

What is flow chart?

What is LAN, WAN, MAN?

Differentiate: primary memory and secondary memory, RAM and ROM,ROM and PROM.

Which are the primary storage and secondary storage devices?

What is parallel computing?