

Chapter 4: Introduction to Problem Solving

1. What is the first step in the problem-solving cycle?

- A) Coding
- B) Testing
- C) Understanding and analyzing the problem**
- D) Documentation

2. Which technique divides a complex problem into smaller sub-problems?

- A) Iteration
- B) Decomposition**
- C) Compilation
- D) Debugging

3. An algorithm must always have:

- A) Infinite steps
- B) Finite number of steps**
- C) Only one input
- D) No output

4. Which symbol is used to represent a decision in a flowchart?

- A) Rectangle
- B) Oval
- C) Diamond**
- D) Parallelogram

5. Which flowchart symbol represents input/output operations?

- A) Rectangle
- B) Diamond
- D) Parallelogram**
- C) Oval

6. Which flowchart symbol represents a process or calculation?

- A) Rectangle**
- B) Diamond
- C) Circle
- D) Oval

7. Verifying an algorithm means:

- A) Writing the program
- B) Converting it into machine code

C) Checking whether it works correctly using sample inputs

- D) Deleting errors from the program

8. Which of the following is considered while comparing algorithms?

- A) Time efficiency
- B) Memory usage
- D) All of the above**
- C) Simplicity

9. Which symbol is used to indicate the Start or End of a flowchart?

- A) Rectangle
- B) Oval**
- C) Diamond
- D) Circle

10. Which of the following is NOT a stage of the problem-solving cycle?

- A) Problem Analysis
- B) Solution Design
- D) Virus Scanning**
- C) Program Testing

11. Which of the following is an advantage of decomposition?

- A) Makes problems more difficult
- B) Increases program errors
- C) Simplifies solving large problems**
- D) Eliminates the need for algorithms

12. Which statement about an algorithm is correct?

- A) It may produce different results for the same input.

B) It should have clearly defined instructions.

C) It never ends.

D) It does not require input or output.

13. Which of the following is NOT a standard flowchart symbol?

A) Rectangle

B) Diamond

C) Triangle

D) Oval

14. Which step comes after designing the solution in the problem-solving cycle?

A) Problem Analysis

B) Implementation (Coding)

C) Documentation

D) Maintenance

15. What is the main purpose of using a flowchart?

A) To write the program code

B) To visually represent the steps of an algorithm

C) To compile the program

D) To remove syntax errors

1. What is problem solving?

Answer: Problem solving is the process of identifying a problem, analyzing it, designing a solution, implementing it, and testing the solution to obtain the desired result.

2. What is the problem-solving cycle?

Answer: The problem-solving cycle is a systematic process used to solve a problem efficiently. It includes understanding the problem, designing a solution, implementing it, testing it, and maintaining it.

3. What is decomposition? Explain with an example.

Answer: Decomposition is the process of breaking a complex problem into smaller, manageable sub-problems.

Example: To build a school management system, divide it into modules such as Student Records, Fee Management, Attendance, and Examination.

4. What is an algorithm?

Answer: An algorithm is a finite sequence of well-defined steps used to solve a problem or perform a specific task.

5. Differentiate between an algorithm and a program.

Algorithm	Program
Step-by-step solution to a problem	Written in a programming language
Easy to understand	Executed by a computer
Language independent	Language dependent

6. What is a flowchart?

Answer: A flowchart is a graphical representation of an algorithm using standard symbols connected by arrows.

7. Write any four advantages of using a flowchart.

Answer:

- Easy to understand.
- Helps in planning the solution.
- Makes debugging easier.
- Improves communication among developers.

8. Name any four standard flowchart symbols.

Answer:

Symbol	Purpose
Oval	Start/End
Rectangle	Process
Diamond	Decision
Parallelogram	Input/Output

9. Why is algorithm verification important?

Answer:

- Finds logical errors.
- Ensures correct output.
- Saves programming time.
- Improves reliability.

10. Explain the terms Input and Output in an algorithm.

Answer:

- **Input:** The data provided to an algorithm for processing.
- **Output:** The result produced after processing the input.

11. Why should an algorithm have a finite number of steps?

Answer:

An algorithm should have a finite number of steps so that it always terminates after producing the required output and does not run forever.

12. Why is problem analysis important?

Answer:

Problem analysis helps in understanding the problem, identifying the required inputs and outputs, and selecting the best solution.

13. What is debugging?

Answer:

Debugging is the process of finding and correcting errors (bugs) in a program.

14. What is documentation? Why is it important?

Answer:

Documentation is the written description of a program, including its purpose, design, and usage. It helps users and programmers understand and maintain the program.

25. What is the difference between syntax errors and logical errors?

Syntax Error	Logical Error
Violates programming language rules.	Program runs but produces incorrect output.
Detected by the compiler/interpreter.	Found during testing or verification.

Long Question

1. Define an algorithm. Write any three characteristics of a good algorithm.

Answer:

An **algorithm** is a step-by-step procedure to solve a problem.

Characteristics:

- It should have a finite number of steps.
- It should have clearly defined instructions.
- It should accept input and produce output.

2. Write the steps of the problem-solving cycle.

Answer:

1. Problem Analysis
2. Solution Design
3. Implementation
4. Testing and Debugging
5. Documentation and Maintenance

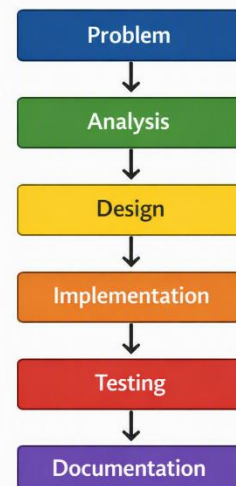
3. Explain the Problem-Solving Cycle with a diagram.

Answer:

The **Problem-Solving Cycle** is a systematic process used to solve problems.

Steps:

1. Understand and analyze the problem.
2. Design the solution (Algorithm/Flowchart).
3. Implement the solution (Coding).
4. Test and Debug.
5. Documentation and Maintenance.



4. Explain the characteristics of a good algorithm.

Answer:

A good algorithm should have the following characteristics:

1. **Input:** Accepts zero or more inputs.
2. **Output:** Produces at least one output.
3. **Definiteness:** Every step is clear and unambiguous.
4. **Finiteness:** Terminates after a finite number of steps.
5. **Effectiveness:** Every step is simple and executable.

5. Explain decomposition with a suitable example.

Answer:

Decomposition is the process of dividing a complex problem into smaller sub-problems.

Advantages:

- Simplifies problem solving.
- Makes coding easier.
- Helps teamwork.
- Easier testing and debugging.

Example: Online Shopping System

- User Registration
- Product Search
- Shopping Cart
- Payment
- Order Tracking

Algorithm Question

1. Write an algorithm to add two numbers.

Algorithm:

- Step 1** – START
- Step 2** – Declare three integers A, B, and SUM.
- Step 3** – Input values of A and B.
- Step 4** – Calculate $SUM = A + B$.
- Step 5** – Display SUM.
- Step 6** – STOP.

2. Write an algorithm to find the largest of two numbers.

Algorithm:

- Step 1** – START
- Step 2** – Declare two integers A and B.
- Step 3** – Input values of A and B.
- Step 4** – Compare A and B.
- Step 5** – If $A > B$, display "A is the largest"; otherwise display "B is the largest".

Step 6 – STOP.

3. Write an algorithm to check whether a number is even or odd.

Algorithm:

Step 1 – START

Step 2 – Declare an integer N.

Step 3 – Input the value of N.

Step 4 – Find the remainder when N is divided by 2.

Step 5 – If the remainder is 0, display "Even Number"; otherwise display "Odd Number".

Step 6 – STOP.

4. Write an algorithm to calculate the area of a rectangle.

Algorithm:

Step 1 – START

Step 2 – Declare three variables Length, Breadth, and Area.

Step 3 – Input the values of Length and Breadth.

Step 4 – Calculate Area = Length × Breadth.

Step 5 – Display Area.

Step 6 – STOP.

5. Write an algorithm to calculate the average of three numbers.

Algorithm:

Step 1 – START

Step 2 – Declare four variables A, B, C, and AVG.

Step 3 – Input the values of A, B, and C.

Step 4 – Calculate $AVG = (A + B + C) / 3$.

Step 5 – Display AVG.

Step 6 – STOP.

6. Write an algorithm to find the square of a number.

Algorithm:

Step 1 – START

Step 2 – Declare two variables N and SQUARE.

Step 3 – Input the value of N.

Step 4 – Calculate $SQUARE = N \times N$.

Step 5 – Display SQUARE.

Step 6 – STOP.

7. Write an algorithm to check whether a person is eligible to vote.

Algorithm:

Step 1 – START

Step 2 – Declare an integer AGE.

Step 3 – Input the value of AGE.

Step 4 – If $AGE \geq 18$, display "**Eligible to Vote**".

Step 5 – Otherwise, display "**Not Eligible to Vote**".

Step 6 – STOP.