



# **SNS COLLEGE OF ENGINEERING**

Kurumbapalayam (Po), Coimbatore – 641 107

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## **DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**COURSE NAME : 20CS101 PROGRAMMING FOR PROBLEM SOLVING**

**I YEAR /I SEMESTER**

**Unit 1- INTRODUCTION TO PROBLEM SOLVING TECHNIQUES**

**Topic 5: Problem formulation - Algorithmic problem solving**





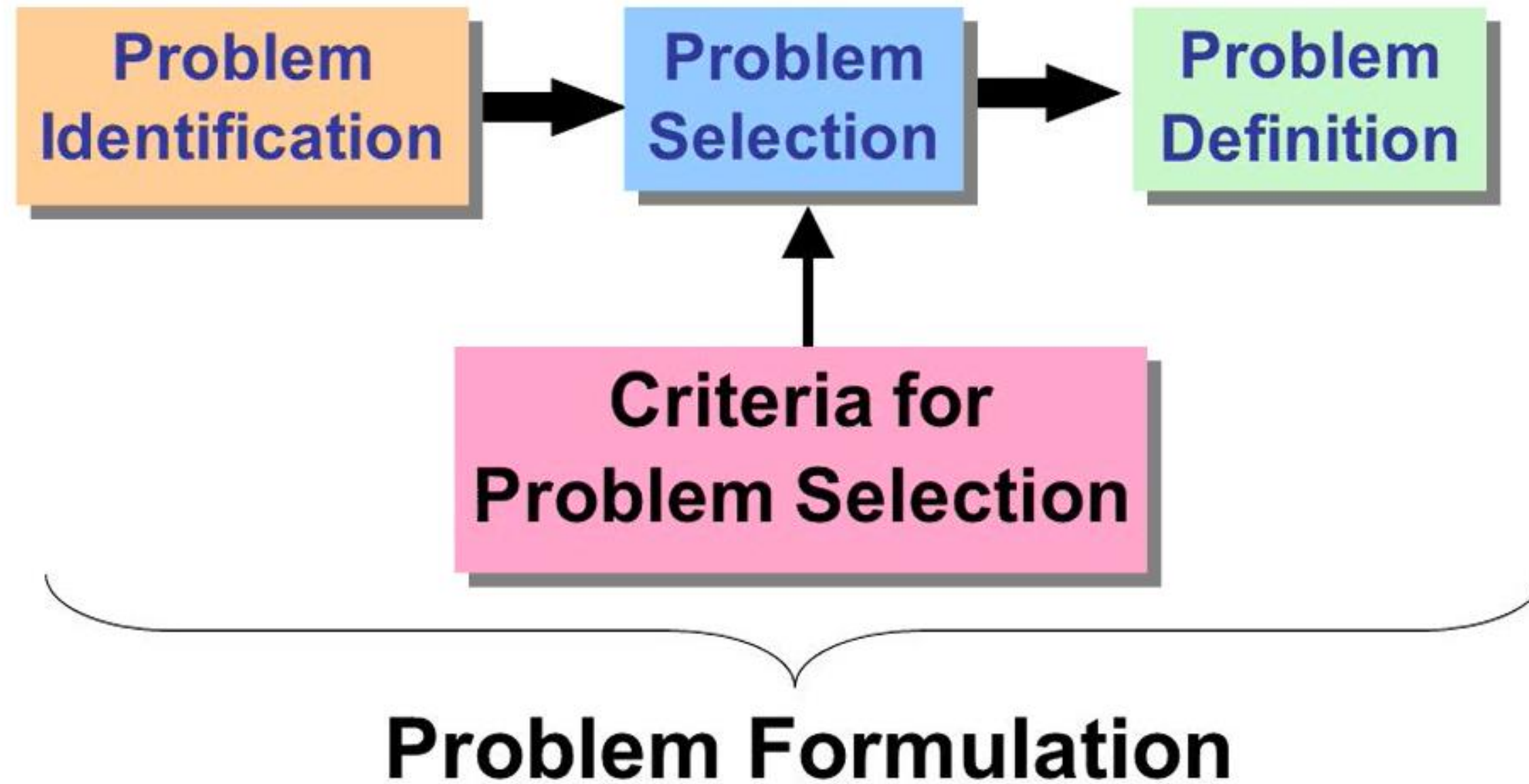
# Brain Storming



1. How to write a program for any given problem?



# Problem Formulation





# Algorithmic Problem Solving



- “Algorithmic-problem solving”; this means solving problems that require the formulation of an algorithm for their solution.
- The formulation of algorithms has always been an important element of problem-solving .

## Why we need to go for algorithm to solve problem?

- A computer is a tool that can be used to implement a plan for solving a problem.
- A computer program is a set of instructions for a computer. These instructions describe the steps that the computer must follow to implement a plan.
- An algorithm is a plan for solving a problem.
- A person must design an algorithm.
- A person must translate an algorithm into a computer program.



# An algorithmic Development Process



- Every problem solution starts with a plan. That plan is called an algorithm.
- An algorithm is a plan for solving a problem.

There are many ways to write an algorithm.

- Some are very informal.
- some are quite formal .
- mathematical in nature.
- some are quite graphical.



# Conti...



- Once we have an algorithm, we can translate it into a computer program in some programming language.
- Our algorithm development process consists of five major steps.

Step 1: Obtain a description of the problem.

Step 2: Analyze the problem.

Step 3: Develop a high-level algorithm.

Step 4: Refine the algorithm by adding more detail.

Step 5: Review the algorithm.



# Step 1: Obtain a description of the problem.



This step is much more difficult than it appears. In the following discussion,

- ▶ The word *client* refers to someone who wants to find a solution to a problem,
- ▶ The word *developer* refers to someone who finds a way to solve the problem.
- ▶ The developer must create an algorithm that will solve the client's problem.



## Step 2: Analyze the problem.



- The purpose of this step is to determine both the starting and ending points for solving the problem.
- This process is analogous to a mathematician determining what is given and what must be proven.
- A good problem description makes it easier to perform this step.





## Conti...



- When determining the starting point, we should start by seeking answers to the following questions:

- What data are available?
- Where is that data?
- What formulas pertain to the problem?
- What rules exist for working with the data?
- What relationships exist among the data values?



## Conti...



- When determining the ending point, we need to describe the characteristics of a solution. In other words, how will we know when we're done? Asking the following questions often helps to determine the ending point.

- What new facts will we have?
- What items will have changed?
- What changes will have been made to those items?
- What things will no longer exist?



# Step 3: Develop a high-level algorithm.



- An algorithm is a plan for solving a problem, but plans come in several levels of detail.
- It's usually better to start with a high-level algorithm that includes the major part of a solution.

**Problem:** I need a send a birthday card to my brother, Mark.

**Analysis:** I don't have a card. I prefer to buy a card rather than make one myself.

**High-level algorithm:**

Go to a store that sells greeting cards  
Select a card  
Purchase a card  
Mail the card



## Step 4: Refine the algorithm by adding more detail.



- Stepwise refinement is a process for developing a detailed algorithm by gradually adding detail to a high-level algorithm.
- The previous algorithm is satisfactory for daily use, but it lacks details that would have to be added were a computer to carry out the solution. These details include answers to questions such as the following.

- "Which store will I visit?"
- "How will I get there: walk, drive, ride my bicycle, take the bus?"
- "What kind of card does Mark like: humorous, sentimental, risqué?"



## Step 5: Review the algorithm.



- Need to work through the algorithm step by step to determine whether or not it will solve the original problem.
- The following questions are typical of ones that should be asked whenever we review an algorithm.

By reviewing an algorithm, you ensure that:

- It solves the problem correctly.
- It works efficiently and in the correct order.
- It handles unusual situations (edge cases).
- It can be improved by combining or simplifying steps.



# Assessment 1



1. What is problem formulation?

Ans : \_\_\_\_\_

