



**University of Colombo School of Computing**  
**SCS 1304 - Problem Solving Strategies and**  
**Computation Approaches**

Lab Sheet 02

---

**Select the correct answer**

**01. Which of the following best describes the purpose of decomposition in computational thinking?**

- a) Combining small problems into a larger problem
- b) Breaking down a complex problem into smaller, more manageable parts
- c) Ignoring irrelevant information
- d) Creating step-by-step instructions to solve a problem

**02. What is a primary benefit of pattern recognition in computational thinking?**

- a) It helps to combine different patterns into a complex one
- b) It identifies similarities and trends to simplify complex problems
- c) It focuses on irrelevant details
- d) It creates detailed flowcharts for algorithms

**03. Abstraction in computational thinking involves:**

- a) Ignoring all details of a problem
- b) Focusing on the most important details while ignoring the irrelevant
- c) Creating a physical model of the problem
- d) Detailing every single aspect of the problem

**04. Which approach is characterized by breaking a problem down into subproblems that can be solved independently?**

- a) Pattern Recognition
- b) Abstraction
- c) Algorithm Design
- d) Decomposition

**05. In computational thinking, what does algorithm design specifically entail?**

- a) Identifying patterns in data
- b) Ignoring irrelevant information
- c) Developing step-by-step instructions to solve a problem
- d) Breaking down a problem into smaller parts

**06. Which of the following is NOT a typical strategy in problem-solving?**

- a) Trial and Error
- b) Algorithm and Heuristic
- c) Means-Ends Analysis
- d) Random Guessing

**07. The role of algorithms in problem-solving primarily includes:**

- a) Focusing on the hardware requirements
- b) Abstracting and generalizing solutions
- c) Creating and evaluating detailed step-by-step procedures
- d) Identifying irrelevant details to ignore

**08. Which computational thinking approach is most closely associated with model development?**

- a) Pattern Recognition
- b) Decomposition
- c) Algorithmic Expression
- d) Problem Specification

**09. Declarative programming focuses on:**

- a) How the program should run step by step
- b) Describing what the program should achieve
- c) Detailed procedural steps
- d) Implementing complex control flows

**10. Which problem-solving approach involves creating algorithms that are efficient and optimal for the given problem?**

- a) Greedy Approach
- b) Brute-Force Approach
- c) Backtracking Approach
- d) Divide and Conquer Approach

**11. In computational thinking, the step of 'Solution Implementation & Evaluation' includes:**

- a) Only creating the actual solution
- b) Evaluating the solution's correctness and efficiency
- c) Ignoring the testing phase
- d) Only implementing the solution without evaluation

**12. What is the first step in the problem-solving process using computational thinking?**

- a) Solution Implementation
- b) Problem Specification
- c) Algorithmic Expression
- d) Evaluation

**13. Which of the following best describes the Brute-Force Approach?**

- a) It involves using heuristics to find a solution quickly
- b) It systematically tests all possible solutions
- c) It divides a problem into subproblems
- d) It uses algorithms that make locally optimal choices

**14. Which computational thinking skill is essential for identifying patterns across different components of a problem?**

- a) Decomposition
- b) Abstraction
- c) Pattern Recognition
- d) Algorithm Design

**15. In the context of algorithmic expression, which of the following is NOT typically used?**

- a) Flowcharts
- b) Pseudocode
- c) UML diagrams
- d) SQL queries

**16. What does the Divide and Conquer Approach typically involve?**

- a) Solving the problem as a whole without breaking it down
- b) Dividing the problem into subproblems, solving each one, and combining the results
- c) Randomly guessing the solution
- d) Using simple heuristics to find an optimal solution

**17. Continuous integration and continuous delivery (CI/CD) tools help with:**

- a) Automating the coding process
- b) Decomposing problems into smaller parts
- c) Automating development, deployment, and testing
- d) Creating algorithms

**18. Which step of computational thinking involves presenting solutions in a way that both humans and computers can understand?**

- a) Decomposition
- b) Pattern Recognition
- c) Abstraction
- d) Algorithm Design

**19. The 'Greedy Approach' in problem-solving is best described as:**

- a) Making the globally optimal choice at each step
- b) Systematically testing all possible solutions
- c) Breaking down the problem into smaller, manageable parts
- d) Making the locally optimal choice at each step

**20. Which of the following is a key characteristic of imperative programming?**

- a) Describing what you want the program to achieve
- b) Focusing on the control flow of the program
- c) Using SQL for database queries
- d) Ignoring the sequence of operations

***Answer the following questions based on the given data.***

- 01.** You are given a dataset containing sales figures for a retail store over the past 12 months. The dataset includes the following columns: Month, Total Sales, Number of Transactions, and Average Transaction Value. Your task is to identify patterns in the data to help the store manager make informed business decisions.

Month	Total Sales (\$)	Number of Transactions	Average Transaction Value (\$)
January	25,000	500	50
February	30,000	600	50
March	28,000	560	50
April	22,000	440	50
May	35,000	700	50
June	40,000	800	50
July	38,000	760	50
August	45,000	900	50
September	40,000	800	50
October	50,000	1,000	50
November	55,000	1,100	50
December	60,000	1,200	50

- A. Identify the months with the highest and lowest total sales. What patterns can you observe in terms of sales fluctuations throughout the year?
  - B. Compare the number of transactions each month. Is there a pattern or trend in the number of transactions over the months?
  - C. Analyze the consistency of the average transaction value across the months. What does this tell you about the store's pricing strategy?
  - D. Based on the observed patterns, predict the total sales and the number of transactions for the next month (January of the next year). Explain your reasoning
  - E. Suggest two strategies the store manager could implement to increase total sales, based on the identified patterns
  - F. Discuss how recognizing these patterns can help in making business decisions. Provide an example of a decision that could be influenced by these patterns.
- 
2. You are tasked with developing a new online library management system. The system should allow users to search for books, borrow books, return books, and manage their user accounts. To build this system effectively, you need to break down the problem into smaller, manageable parts (functional decomposition).
    - A. List the major functions that the online library management system must perform. For each major function identified, break it down further into sub-functions or tasks. Provide at least two sub-functions for each major function.
    - B. Explain how functional decomposition helps in managing the complexity of the system development. Provide an example from your decomposition to illustrate this benefit.
- 
3. You are tasked with designing a flowchart for the "Borrow Books" function of an online library management system. The flowchart should clearly illustrate the steps involved from the moment a user selects a book to borrow until the book is successfully borrowed and the system is updated.

*Hint:*

To draw the flowchart for the "Borrow Books" function, start by understanding the key steps: user logs in, navigates the book catalog, selects a book, and the system checks its availability. If the book is available, the system updates the user account and book inventory, and notifies the user of successful borrowing. If not available, the user is notified of the unavailability.