Advanced Programming (OOP) Lab

Assignment–2

Report Instructions

This document specifies the mandatory structure and assignment-specific questionnaires for the handwritten report corresponding to Assignment–2: Java Basics – Constructors, Arrays, and Function Overloading. The report will be evaluated for conceptual clarity, design reasoning, and individual understanding, not for code volume.

General Submission Rules

- The report must be handwritten and submitted individually.
- Do not rewrite complete programs; include only selective and relevant code fragments.
- All explanations must be original and written in the student's own words.
- Every mandatory and attempted bonus exercise must be reflected in the report.
- Similarity in explanation style across reports will attract penalties.

Tip: Use multiple colors for highlighting your explanations, references and annotations.

Section A: Conceptual Interpretation

Explain, in your own words, the role of constructors, arrays of objects, and function overloading in this assignment. Clearly state why these features are necessary instead of using a single constructor and standalone functions.

Section B: Constructor Design Analysis

Answer the following questions:
1. What problem does a default constructor solve in this program?
2. How does a parameterized constructor improve object initialization?
3. Explain the purpose of the copy constructor and one situation where it is essential.
4. What would be the impact of removing one of the constructors?

Section C: Array of Objects Reasoning

Describe how an array of Student objects is created, initialized, and accessed. Explain how object arrays differ conceptually from arrays of primitive data types. Include one small code snippet illustrating object storage or traversal.

Section D: Function Overloading Justification

Explain how function overloading is implemented in this assignment. Discuss how the compiler differentiates between overloaded methods. State one advantage and one potential misuse of function overloading.

Section E: Algorithmic Reasoning for Exercises

For any two exercises or bonus exercises you attempted:
- Describe the algorithm in step-by-step English or pseudocode
- Explain why the algorithm terminates correctly
- State the time complexity in terms of number of students

Section F: What-If and Design Variation Analysis

Answer any two of the following:
1. What changes are required if ArrayList replaces the array?
2. What issues arise if constructors perform input/output operations?
3. How would sorting logic change if students are sorted by multiple attributes?
4. What breaks if method overloading is replaced by conditional logic inside one method?

Section G: Individual Extension Task

Implement and explain one small extension of your choice, such as:
- Adding a new attribute to the Student class
- Introducing validation logic in constructors
- Modifying display methods to support formatted output

Explain the design impact of your extension.

Section H: Error and Learning Reflection

Document one error or conceptual difficulty faced while completing this assignment. Explain how it was resolved and what programming principle became clearer as a result.

Section I: AI Usage Disclosure

Declare whether AI or online tools were used. Specify:
- Which part was assisted
- How the generated content was modified or verified

Unreflected use will be penalized.