School of Computer Science and Artificial Intelligence

Lab Assignment # 3.1

Program : B. Tech (CSE)

Specialization : AIML

Course Title : AI Assisted

Coding Course Code: 23CS002PC304

Semester : VI

Academic Session : 2025-2026

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Enrollment No. : 2303A52103

Batch No. : 33

Date : 13/01/26

Title

Experiment on Prompt Engineering Techniques for Python Program Generation Using AI-Assisted Tools

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Lab Objectives

1. To understand and apply different **prompt engineering techniques** for generating Python programs using AI-assisted tools.
2. To analyze the **impact of context, constraints, and examples** on the accuracy and efficiency of AI-generated code.
3. To develop and refine **real-world Python applications** through iterative prompt improvement and testing.

Lab Outcomes

1. Students will be able to **design effective prompts** to generate correct and optimized Python code.
2. Students will be able to **compare and evaluate AI-generated solutions** produced using different prompting strategies.
3. Students will be able to **implement, test, and document real-world Python applications** using AI-assisted coding tools.

Tools Used

- AI-assisted coding tool (ChatGPT)
- Python 3.x
- Standard Python IDE / Interpreter

Experiment 1: Zero-Shot Prompting – Palindrome Number

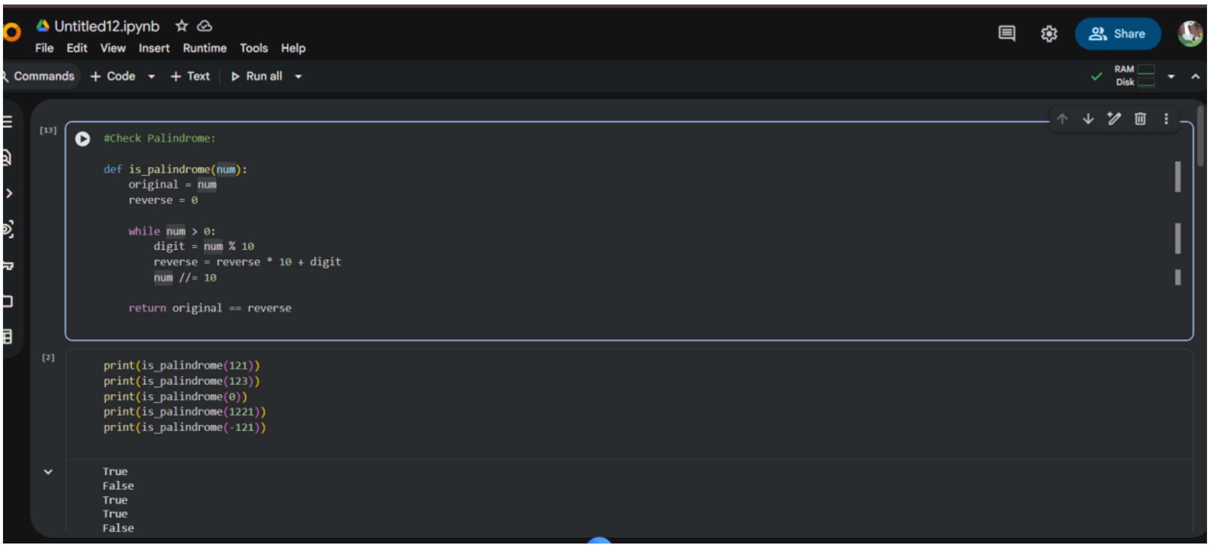
Prompt Type: Zero-Shot

Objective: Check whether a number is a palindrome.

Observations

- AI generated correct logic for positive integers.
- Failed to explicitly handle negative numbers.
- Required manual refinement for edge cases.

CODE:



Experiment 2: One-Shot Prompting – Factorial Calculation

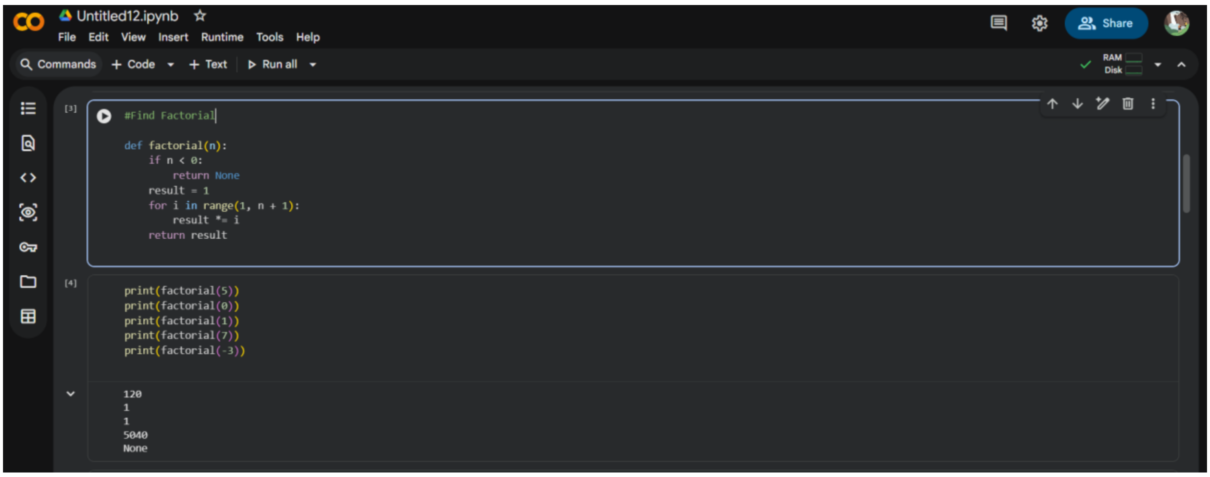
Prompt Type: One-Shot

Example Given: Input: 5 → Output: 120

Observations

- Code clarity improved compared to zero-shot.
- Handled 0! correctly.
- Included basic validation for negative numbers.

CODE:



Experiment 3: Few-Shot Prompting – Armstrong Number Check

Prompt Type: Few-Shot

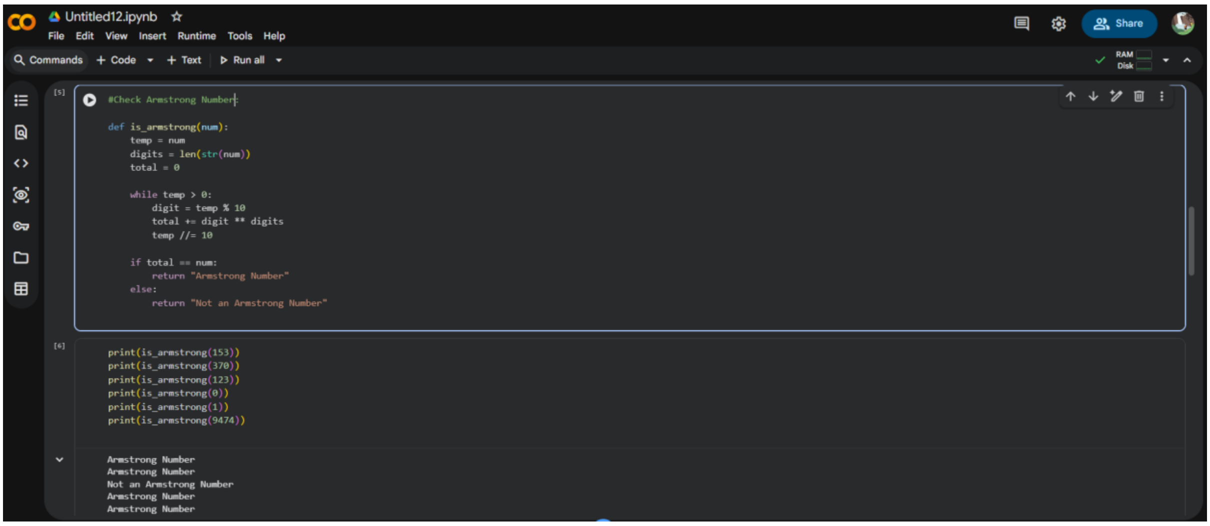
Examples Provided:

- 153 → Armstrong Number
- 370 → Armstrong Number
- 123 → Not an Armstrong Number

Observations

- Correct mathematical logic inferred.
- Output format matched examples exactly.
- Input validation required additional refinement.

CODE:



Experiment 4: Context-Managed Prompting – Number Classification

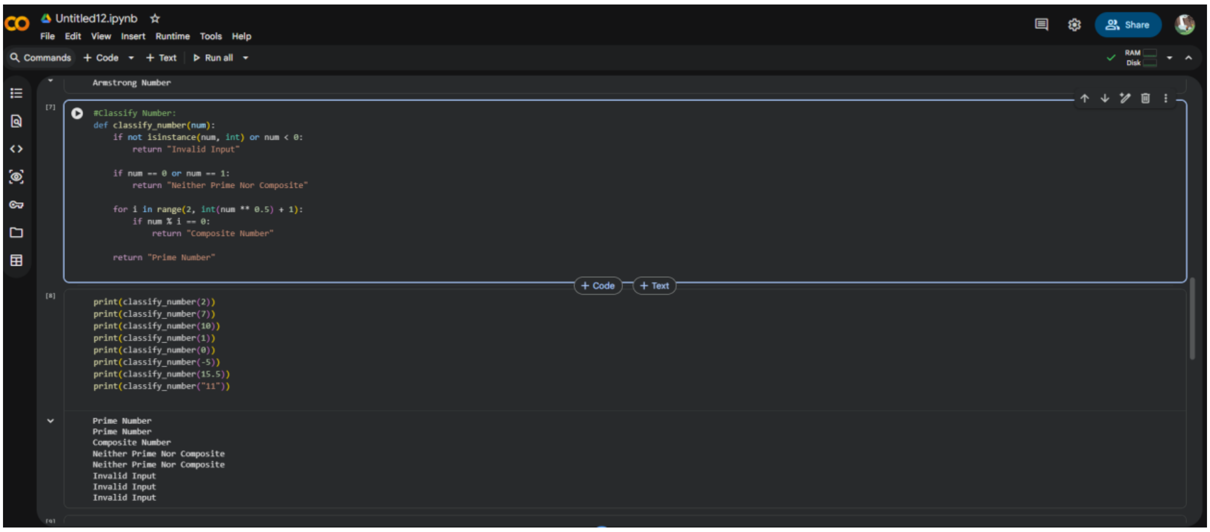
Prompt Type: Context-Managed

Task: Classify a number as **Prime**, **Composite**, or **Neither**.

Observations

- Efficient √n optimization applied.
- Proper handling of 0, 1, and invalid inputs.
- Most robust and production-ready solution.

CODE:



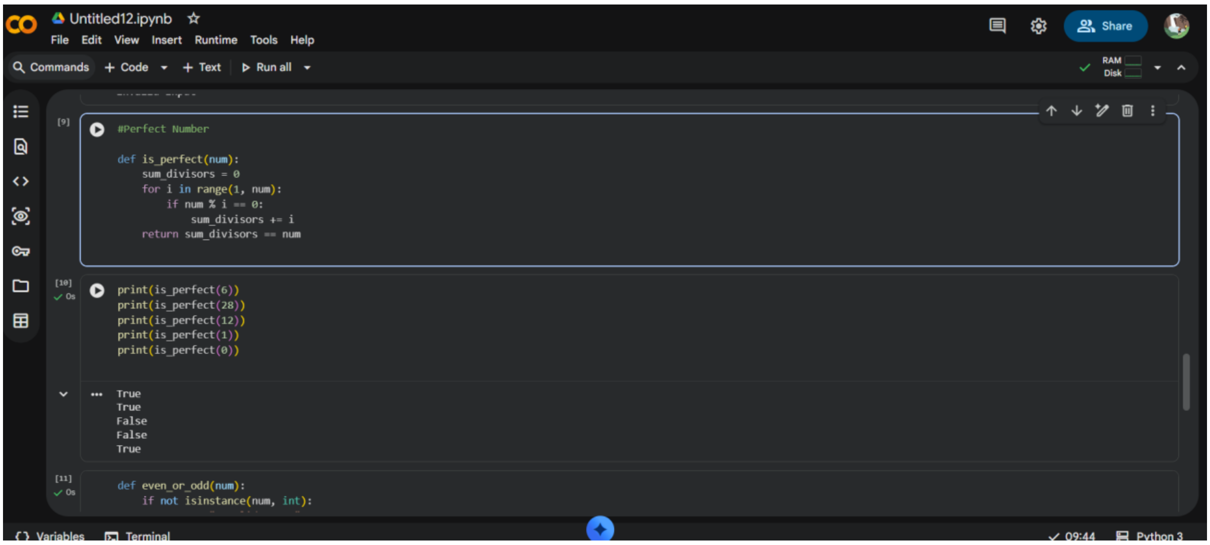
Experiment 5: Zero-Shot Prompting – Perfect Number Check

Prompt Type: Zero-Shot

Observations

- Basic logic generated correctly.
- Logical error for input 0.
- Inefficient O(n) loop required optimization.

CODE:



Experiment 6: Few-Shot Prompting – Even or Odd with Validation

Prompt Type: Few-Shot

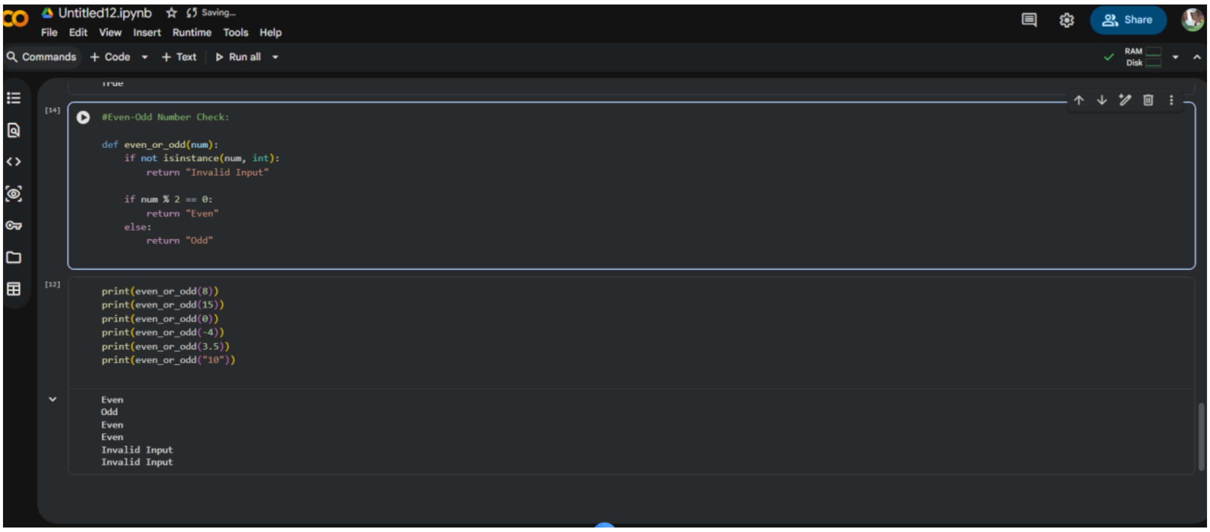
Examples Provided:

- 8 → Even
- 15 → Odd
- 0 → Even

Observations

- Proper input validation inferred.
- Clear and consistent output.
- Negative numbers handled correctly.

CODE:



Comparative Analysis

Prompting Technique	Accuracy	Validation	Efficiency	Clarity
Zero-Shot	Medium	Low	Low	Average
One-Shot	Good	Medium	Medium	Good
Few-Shot	High	High	Medium	Very Good
Context-Managed	Very High	Very High	High	Excellent

Result

- The quality of AI-generated Python code **improves significantly** with better prompt design.

- Few-shot and context-managed prompting produced **more accurate, optimized, and reliable programs**.
- Zero-shot prompting is suitable only for **simple tasks** and requires manual verification.

Conclusion:

This lab successfully demonstrated the effectiveness of various **prompt engineering techniques** in generating Python programs using AI-assisted tools. As the level of guidance in prompts increased—from zero-shot to context-managed—the **accuracy, efficiency, and robustness** of the generated code also improved. Proper prompt design plays a critical role in producing reliable AI-generated software solutions.

Future Scope:

1. Applying prompt engineering techniques to **larger real-world applications** such as web development and data analysis.
2. Exploring advanced prompting methods like **chain-of-thought and self-consistency prompting**.
3. Integrating AI-assisted coding tools into **software engineering workflows** for improved productivity.