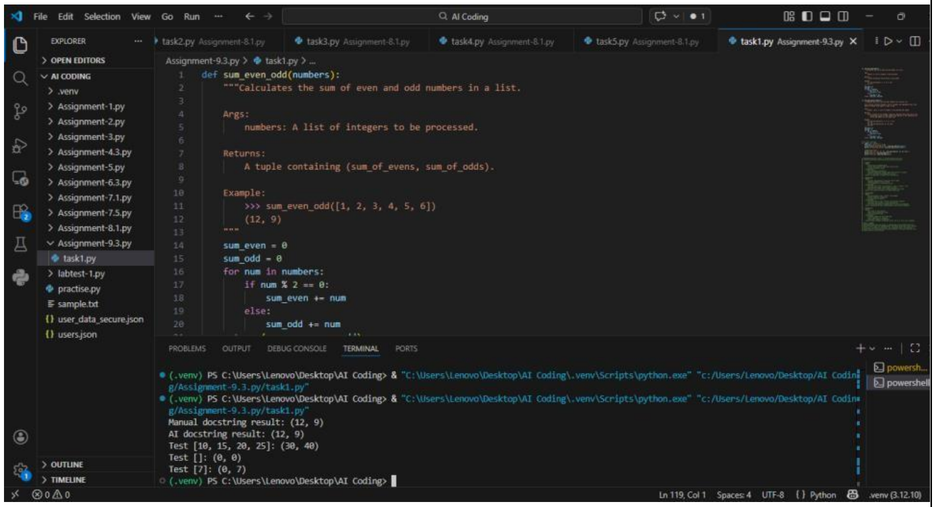
SCHOOLOFCOMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE			**DEPARTMENTOFCOMPUTER SCIENCE ENGINEERING**		
Program Name: B. Tech		**Assignment Type: Lab**		**Academic Year:**2025-2026	
Course Coordinator Name		Dr. Rishabh Mittal			
CourseCode	23CS002PC304	**Course Title**	AI Assisted Coding		
Year/Sem	III/II	**Regulation**	R23		
Date and Day of Assignment	**Week3 – Wednesday**	**Time(s)**	23CSBTB01 To 23CSBTB52		
Name	P.Mani Sai	**Applicable to Batches**	All batches		
AssignmentNumber:9.3(Presentassignmentnumber)/**24**(Totalnumberofassignments)					

Q.No.	Question	*ExpectedTime to complete*
1	**Lab 9: Documentation Generation – Automatic Documentation and Code Comments** **Lab Objectives** • To understand the importance of documentation and code comments in software development • To explore how AI-assisted coding tools generate documentation and inline comments • To practice generating function-level and module-level docstrings automatically • To evaluate the quality and accuracy of AI-generated documentation • To develop a small automated documentation generator in Python **Lab Outcomes (LOs)** After completing this lab, students will be able to: • Apply AI-assisted coding tools to generate docstrings and inline comments • Analyze AI-generated documentation for correctness and readability • Create structured documentation using standard formats (Google, NumPy) • Design a mini documentation generation tool **Task 1: Basic Docstring Generation** **Scenario** You are developing a utility function that processes numerical lists and must be properly documented for future maintenance. **Prompt : Create a Python function named sum_even_odd(numbers) that takes a list of integers and returns a tuple containing the sum of even numbers and sum of odd numbers.** **1. First, write the function with a manually written Google Style docstring including:** **- Description** **- Args** **- Returns** **- Example** **2. Then generate an AI-style Google docstring for the same function separately (without changing logic).**	Week4 - Wednesday

3. Provide a structured comparison analyzing:
- Clarity
- Correctness
- Completeness
- Readability

Ensure the code runs without errors.

Code :



```python
def sum_even_odd(numbers):
    """Calculates the sum of even and odd numbers in a list.

    Args:
        numbers: A list of integers to be processed.

    Returns:
        A tuple containing (sum_of_evens, sum_of_odds).

    Example:
        >>> sum_even_odd([1, 2, 3, 4, 5, 6])
        (12, 9)
    """
    sum_even = 0
    sum_odd = 0
    for num in numbers:
        if num % 2 == 0:
            sum_even += num
        else:
            sum_odd += num
```

```
(.venv) PS C:\Users\Lenovo\Desktop\AI Coding> & "C:\Users\Lenovo\Desktop\AI Coding\.venv\Scripts\python.exe" "c:/Users/Lenovo/Desktop/AI Codin
g/Assignment-9.3.py/task1.py"
(.venv) PS C:\Users\Lenovo\Desktop\AI Coding> & "C:\Users\Lenovo\Desktop\AI Coding\.venv\Scripts\python.exe" "c:/Users/Lenovo/Desktop/AI Codin
g/Assignment-9.3.py/task1.py"
Manual docstring result: (12, 9)
AI docstring result: (12, 9)
Test [10, 15, 20, 25]: (30, 40)
Test []: (0, 0)
Test [7]: (0, 7)
(.venv) PS C:\Users\Lenovo\Desktop\AI Coding>
```

Requirements
• Write a Python function to return the **sum of even numbers** and **sum of odd numbers** in a given list
• Manually add a **Google Style docstring** to the function
• Use an AI-assisted tool (Copilot / Cursor AI) to generate a function-level docstring
• Compare the **AI-generated docstring** with the **manually written docstring**
• Analyze clarity, correctness, and completeness
Expected Output
• Python function with manual Google-style docstring
• AI-generated docstring for the same function
• Comparison explaining differences between manual and AI-generated documentation
• Improved understanding of AI-generated function-level documentation

Explanation : In this task, we create a function `sum_even_odd(numbers)` that finds the sum of even and odd numbers from a list and returns them as a tuple. The main focus is writing Google Style docstrings manually and then generating an AI-style docstring for the same function. Finally, both docstrings are compared based on clarity, correctness, completeness, and readability.

Task 2: Automatic Inline Comments
Scenario
You are developing a student management module that must be easy to understand for new developers.
Prompt : Create a Python class named sru_student with:

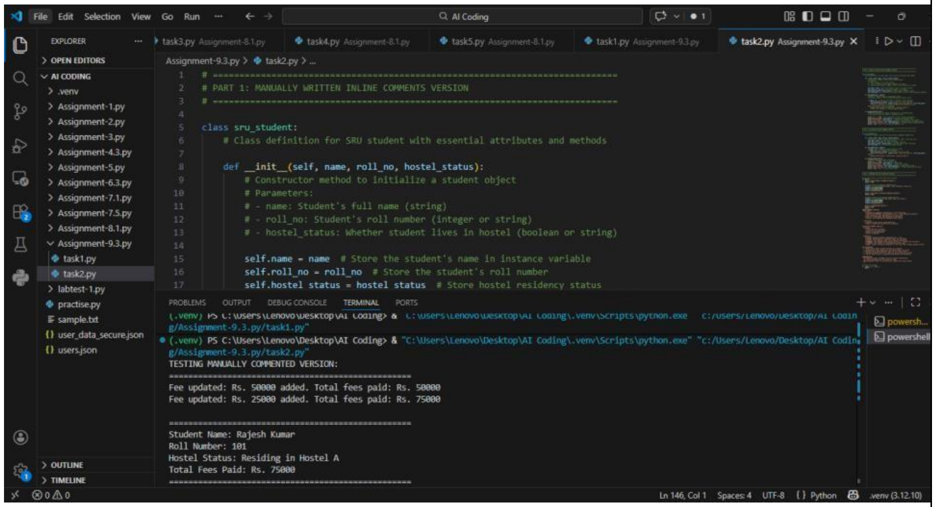
Attributes:
- name
- roll_no
- hostel_status

Methods:
- fee_update(amount)
- display_details()

1. First, write the class with detailed manual inline comments explaining each line or logical block.
2. Then generate an AI-assisted version of inline comments for the same code (without changing logic).
3. Provide a comparison discussing:
- Missing comments
- Redundant comments
- Incorrect explanations
- Strengths and limitations of AI-generated comments

Ensure the program runs without errors.

Code :



```
# ==========================================================================
# PART 1: MANUALLY WRITTEN INLINE COMMENTS VERSION
# ==========================================================================

class sru_student:
    # Class definition for SRU student with essential attributes and methods

    def __init__(self, name, roll_no, hostel_status):
        # Constructor method to initialize a student object
        # Parameters:
        # - name: Student's full name (string)
        # - roll_no: Student's roll number (integer or string)
        # - hostel_status: Whether student lives in hostel (boolean or string)

        self.name = name  # Store the student's name in instance variable
        self.roll_no = roll_no  # Store the student's roll number
        self.hostel status = hostel status  # Store hostel residency status
```

```
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g/Assignment-9.3.py/task1.py"
(.venv) PS C:\Users\Lenovo\Desktop\AI Coding> & "C:\Users\Lenovo\Desktop\AI Coding\.venv\Scripts\python.exe" "c:/Users/Lenovo/Desktop/AI Codin
g/Assignment-9.3.py/task2.py"
TESTING MANUALLY COMMENTED VERSION:
==================================================
Fee updated: Rs. 50000 added. Total fees paid: Rs. 50000
Fee updated: Rs. 25000 added. Total fees paid: Rs. 75000

==================================================
Student Name: Rajesh Kumar
Roll Number: 101
Hostel Status: Residing in Hostel A
Total Fees Paid: Rs. 75000
==================================================
```

Requirements
• Write a Python program for an sru_student class with the following:
– Attributes: name, roll_no, hostel_status
– Methods: fee_update() and display_details()
• Manually write **inline comments** for each line or logical block
• Use an AI-assisted tool to automatically add inline comments
• Compare **manual comments** with **AI-generated comments**
• Identify missing, redundant, or incorrect AI comments
Expected Output
• Python class with manually written inline comments
• AI-generated inline comments added to the same code
• Comparative analysis of manual vs AI comments
• Critical discussion on strengths and limitations of AI-generated comments

Explanation : In this task, we create a class `sru_student` with attributes like name, roll number, and hostel status, and methods to update fees and display details. First, the code is written with detailed manual inline comments. Then AI-generated comments are written for the same code. Finally, we compare both comment styles and analyze missing, redundant, and incorrect comments.

Task 3: Module-Level and Function-Level Documentation
Scenario
You are building a small calculator module that will be shared across multiple projects and requires structured documentation.
Prompt: Create a Python calculator module containing four functions:
- add(a, b)
- subtract(a, b)
- multiply(a, b)

- divide(a, b)

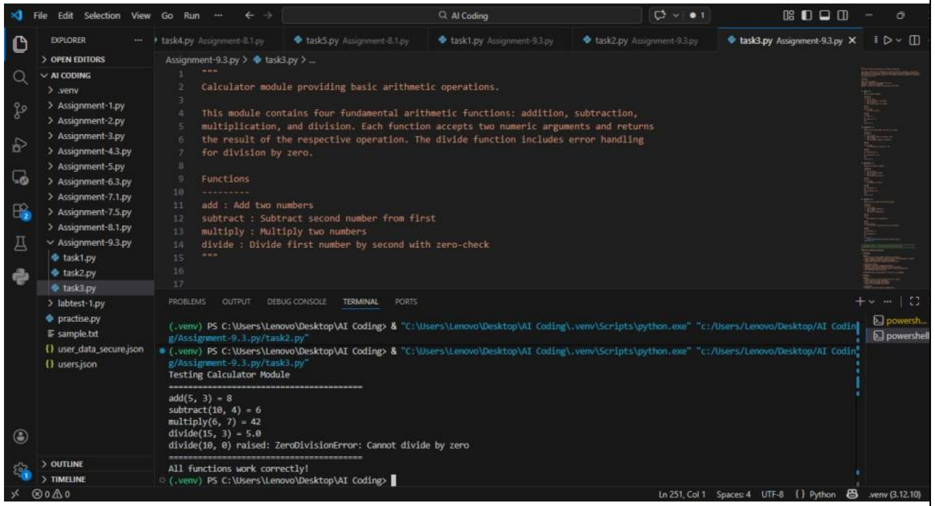
1. First, manually write NumPy Style docstrings for each function including:
- Parameters
- Returns
- Raises (for divide by zero)
- Example

2. Then generate:
- A module-level docstring
- AI-generated NumPy Style function-level docstrings (without modifying function logic)

3. Provide a structured comparison evaluating:
- Structure
- Accuracy
- Completeness
- Readability
- Professional quality

Ensure the code runs without errors.

Code :



```
"""
Calculator module providing basic arithmetic operations.

This module contains four fundamental arithmetic functions: addition, subtraction,
multiplication, and division. Each function accepts two numeric arguments and returns
the result of the respective operation. The divide function includes error handling
for division by zero.

Functions
---------
add : Add two numbers
subtract : Subtract second number from first
multiply : Multiply two numbers
divide : Divide first number by second with zero-check
"""
```

```
(.venv) PS C:\Users\Lenovo\Desktop\AI Coding> & "C:\Users\Lenovo\Desktop\AI Coding\.venv\Scripts\python.exe" "c:/Users/Lenovo/Desktop/AI Codin
g/Assignment-9.3.py/task2.py"
(.venv) PS C:\Users\Lenovo\Desktop\AI Coding> & "C:\Users\Lenovo\Desktop\AI Coding\.venv\Scripts\python.exe" "c:/Users/Lenovo/Desktop/AI Codin
g/Assignment-9.3.py/task3.py"
Testing Calculator Module
========================================
add(5, 3) = 8
subtract(10, 4) = 6
multiply(6, 7) = 42
divide(15, 3) = 5.0
divide(10, 0) raised: ZeroDivisionError: Cannot divide by zero
========================================
All functions work correctly!
(.venv) PS C:\Users\Lenovo\Desktop\AI Coding>
```

Requirements
• Write a Python script containing **3–4 functions** (e.g., add, subtract, multiply, divide)
• Manually write **NumPy Style docstrings** for each function
• Use AI assistance to generate:
– A **module-level docstring**
– Individual **function-level docstrings**
• Compare AI-generated docstrings with manually written ones
• Evaluate documentation structure, accuracy, and readability
Expected Output
• Python script with manual NumPy-style docstrings
• AI-generated module-level and function-level documentation
• Comparison between AI-generated and manual documentation
• Clear understanding of structured documentation for multi-function scripts

Explanation : In this task, we create a calculator module with functions add, subtract, multiply, and divide. Manual NumPy Style docstrings are written for each function, including parameters, returns, raises, and examples. Then AI-generated docstrings and a module-level docstring are created. Finally, we compare manual vs AI docstrings based on

	structure, accuracy, completeness, readability, and professional quality.	
	Additional Requirement • Push the complete project documentation as a **.md file** to a GitHub repository • Ensure documentation covers module overview and function descriptions **Note: Report should be submitted a word document for all tasks in a single document with prompts, comments & code explanation, and output and if required, screenshots**	