SCHOOLOFCOMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE	**DEPARTMENTOFCOMPUTER SCIENCE ENGINEERING**

ProgramName:B. Tech	**AssignmentType: Lab**	**AcademicYear:**2025-2026

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CourseCode	24CS002PC215	**CourseTitle**	AI Assisted Coding
Year/Sem	II/I	**Regulation**	R24
DateandDay of Assignment	Week7 - WednesDay	**Time(s)**	
Duration	2 Hours	**Applicableto Batches**	

AssignmentNumber:13.3(Presentassignmentnumber)/**24**(Totalnumberofassignments)

	Question	***ExpectedTime to complete***
1	**Lab 13 – Code Refactoring: Improving Legacy Code with AI Suggestions** **Lab Objectives**	Week 5 - Monday

- To introduce the concept of code refactoring and why it matters (readability, maintainability, performance).
- To practice using AI tools for identifying and suggesting improvements in legacy code.
- To evaluate the before vs. after versions for clarity, performance, and correctness.
- To reinforce responsible AI-assisted coding practices (avoiding over-reliance, validating outputs).

Learning Outcomes

After completing this lab, students will be able to:

1. Use AI to analyze and refactor poorly written Python code.
2. Improve code **readability, efficiency, and error handling**.
3. Document AI-suggested improvements through comments and explanations.
4. Apply refactoring strategies without changing functionality.
5. Critically reflect on AI's refactoring suggestions.

Task Description #1 – Remove Repetition

Task: Provide AI with the following redundant code and ask it to refactor

Python Code

```
def calculate_area(shape, x, y=0):
    if shape == "rectangle":
        return x * y
    elif shape == "square":
        return x * x
    elif shape == "circle":
        return 3.14 * x * x
```

Expected Output

- Refactored version with dictionary-based dispatch or separate functions.

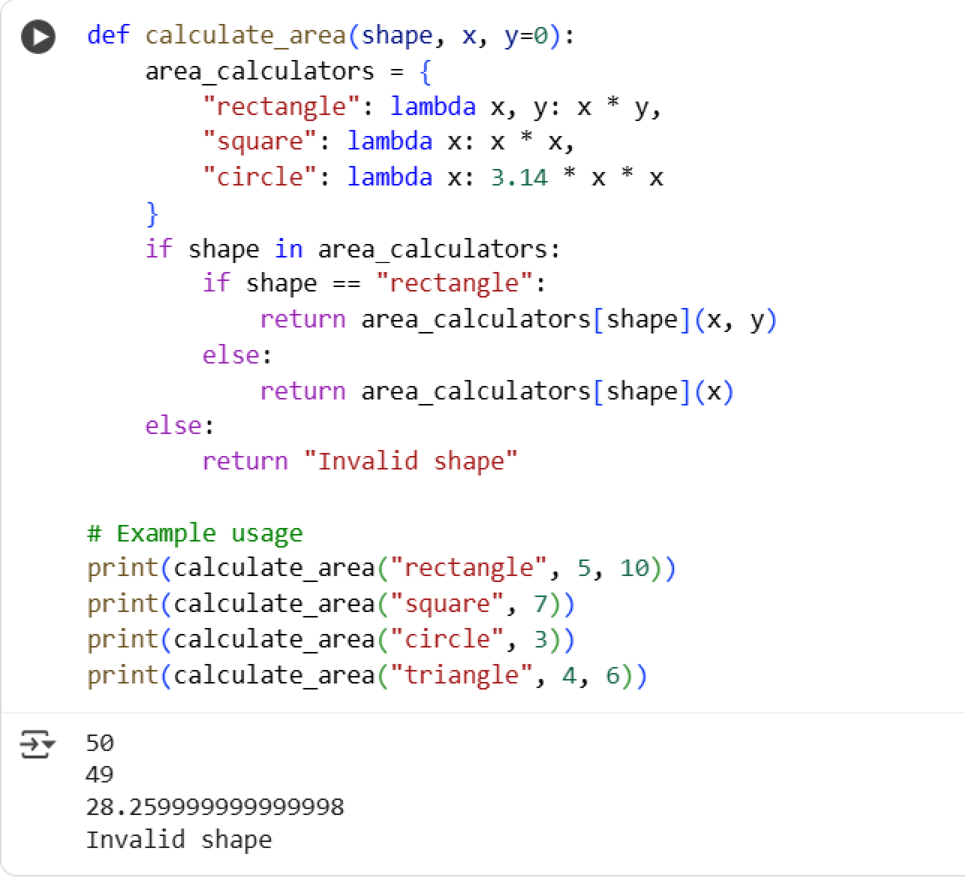
- Cleaner and modular design.

PROMPT:

refactor the following redundant python code...

```
def calculate_area(shape, x, y=0):
if shape == "rectangle":
 return x * y
elif shape == "square":
 return x * x
elif shape == "circle":
 return 3.14 * x * x
```

CODE:



```python
def calculate_area(shape, x, y=0):
    area_calculators = {
        "rectangle": lambda x, y: x * y,
        "square": lambda x: x * x,
        "circle": lambda x: 3.14 * x * x
    }
    if shape in area_calculators:
        if shape == "rectangle":
            return area_calculators[shape](x, y)
        else:
            return area_calculators[shape](x)
    else:
        return "Invalid shape"

# Example usage
print(calculate_area("rectangle", 5, 10))
print(calculate_area("square", 7))
print(calculate_area("circle", 3))
print(calculate_area("triangle", 4, 6))
```

```
50
49
28.259999999999998
Invalid shape
```

OBSERVATION:

This code defines a function `calculate_area` that computes the area of rectangles, squares, and circles using a dictionary to map shape names to their respective area calculation formulas. The output shows the calculated areas for the example shapes and indicates "Invalid shape" for a triangle, as it's not supported.

Task Description #2 – Error Handling in Legacy Code

Task: Legacy function without proper error handling

Python Code

```
def read_file(filename):
    f = open(filename, "r")
    data = f.read()
    f.close()
    return data
the
```

Expected Output:

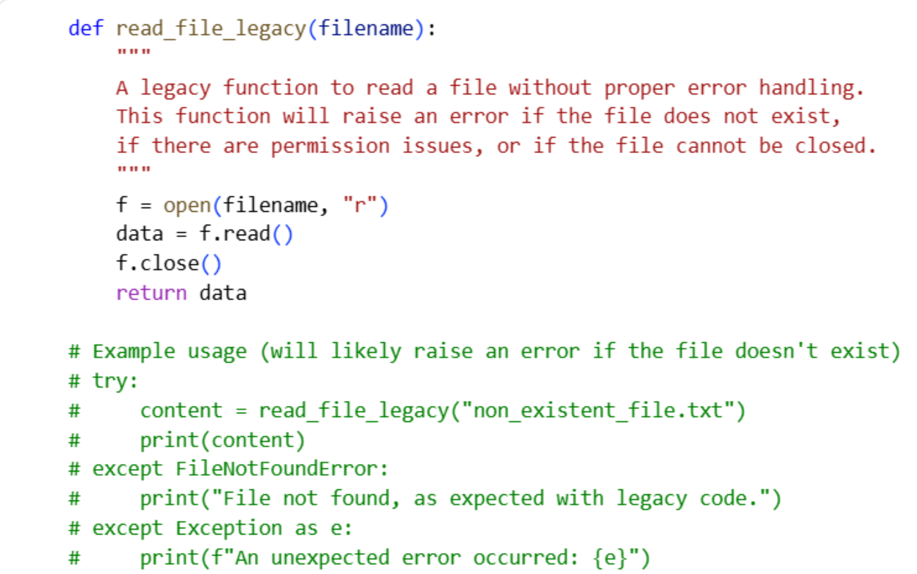
AI refactors with with open() and try-except:

PROMPT:

Generate Legacy function without proper error handling for given python code:

```
def read_file(filename):
    f = open(filename, "r")
    data = f.read()
    f.close()
    return data
the
```

OUTPUT:



```python
def read_file_legacy(filename):
    """
    A legacy function to read a file without proper error handling.
    This function will raise an error if the file does not exist,
    if there are permission issues, or if the file cannot be closed.
    """
    f = open(filename, "r")
    data = f.read()
    f.close()
    return data

# Example usage (will likely raise an error if the file doesn't exist)
# try:
#     content = read_file_legacy("non_existent_file.txt")
#     print(content)
# except FileNotFoundError:
#     print("File not found, as expected with legacy code.")
# except Exception as e:
#     print(f"An unexpected error occurred: {e}")
```

OBSERVATION:

My observation is that the provided `read_file_legacy` function lacks error handling, making it vulnerable to crashes if the specified file doesn't exist or has permission issues.

THE ERROR IS:

Based on the code for `read_file_legacy` and its lack of error handling, the most likely error if the specified file does not exist is a `FileNotFoundError`.

Task Description #3 – Complex Refactoring

Task: Provide this legacy class to AI for readability and modularity improvements:

Python Code

```
class Student:
    def __init__(self, n, a, m1, m2, m3):
        self.n = n
        self.a = a
        self.m1 = m1
        self.m2 = m2
        self.m3 = m3
    def details(self):
        print("Name:", self.n, "Age:", self.a)
    def total(self):
        return self.m1+self.m2+self.m3
```

Expected Output:

- AI improves naming (`name`, `age`, `marks`).
- Adds docstrings.
- Improves print readability.
- Possibly uses `sum(self.marks)` if marks stored in a list.

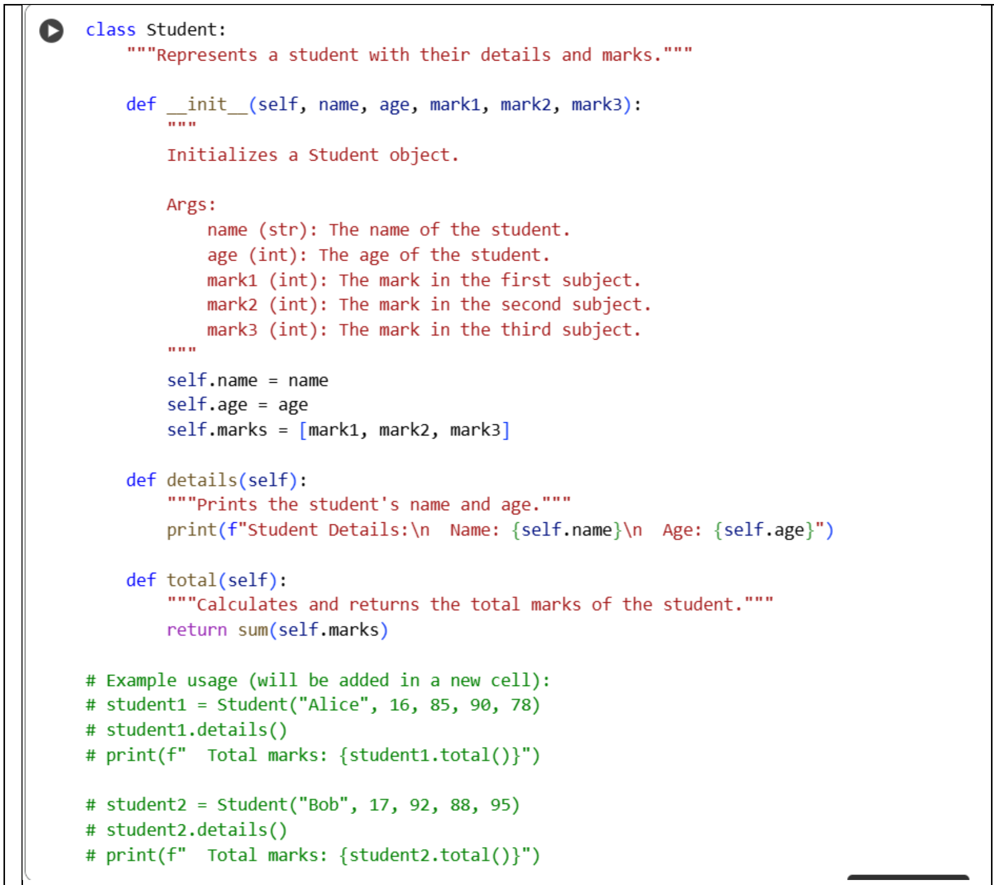
PROMPT:

Generate this legacy class for readability and modularity improvements:

Python code:

```
class Student:
 def __init__(self, n, a, m1, m2, m3):
     self.n = n
     self.a = a
     self.m1 = m1
     self.m2 = m2
     self.m3 = m3
 def details(self):
     print("Name:", self.n, "Age:", self.a)
 def total(self):
     return self.m1+self.m2+self.m3
```

OUTPUT:



```
class Student:
    """Represents a student with their details and marks."""

    def __init__(self, name, age, mark1, mark2, mark3):
        """
        Initializes a Student object.

        Args:
            name (str): The name of the student.
            age (int): The age of the student.
            mark1 (int): The mark in the first subject.
            mark2 (int): The mark in the second subject.
            mark3 (int): The mark in the third subject.
        """
        self.name = name
        self.age = age
        self.marks = [mark1, mark2, mark3]

    def details(self):
        """Prints the student's name and age."""
        print(f"Student Details:\n  Name: {self.name}\n  Age: {self.age}")

    def total(self):
        """Calculates and returns the total marks of the student."""
        return sum(self.marks)

# Example usage (will be added in a new cell):
# student1 = Student("Alice", 16, 85, 90, 78)
# student1.details()
# print(f"  Total marks: {student1.total()}")

# student2 = Student("Bob", 17, 92, 88, 95)
# student2.details()
# print(f"  Total marks: {student2.total()}")
```

OBSERVATION:

This code defines a `Student` class to manage student details and marks, including methods to display details and calculate the total marks.

Task Description #4 – Inefficient Loop Refactoring

Task: Refactor this inefficient loop with AI help

Python Code

```
nums = [1,2,3,4,5,6,7,8,9,10]
squares = []
for i in nums:
    squares.append(i * i)
```

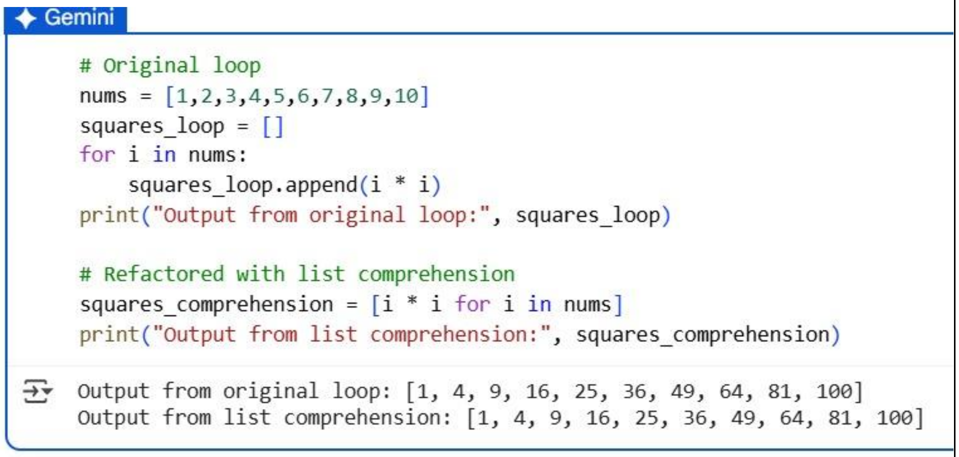
Expected Output: AI suggested a **list comprehension**

PROMPT:

```
nums = [1,2,3,4,5,6,7,8,9,10]
squares = []
for i in nums:
    squares.append(i * i)
```

Refactor this code with inefficient loop with help of list comprehension.

OUTPUT:



```
# Original loop
nums = [1,2,3,4,5,6,7,8,9,10]
squares_loop = []
for i in nums:
    squares_loop.append(i * i)
print("Output from original loop:", squares_loop)

# Refactored with list comprehension
squares_comprehension = [i * i for i in nums]
print("Output from list comprehension:", squares_comprehension)
```

```
Output from original loop: [1, 4, 9, 16, 25, 36, 49, 64, 81, 100]
Output from list comprehension: [1, 4, 9, 16, 25, 36, 49, 64, 81, 100]
```

OBSERVATION:

The list comprehension [i * i for i in nums] effectively replaces the explicit loop for creating the squares list. Both the original loop and the list comprehension produce the same output, demonstrating that list comprehension is a concise and efficient way to achieve the same result as the loop in this case.