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)

Q.No.	Question	*ExpectedTime to complete*
1	Lab 13 – Code Refactoring: Improving Legacy Code with AI Suggestions Lab Objectives	Week5 - Monday

- To introduce the concept of code refactoring and why it matters (readability, maintainability, performance).

- To practiceusingAI tools for identifying and suggesting improvementsinlegacy code.
- To evaluatethebefore vs. after versions for clarity, performance, and correctness.
- To reinforceresponsible AI-assisted coding practices (avoiding over-reliance,validating outputs).

Learning Outcomes

Aftercompletingthislab,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

```
defcalculate_area(shape, x, y=0):
   ifshape == "rectangle":
      return x * y
   elifshape == "square":
      return x * x
   elifshape == "circle":
      return 3.14 * x * x
```

Expected Output

- Refactored version with dictionary-based dispatch or separate functions.
- Cleaner and modular design.

Prompt#1:

Refactor this Python code to make it cleaner and modular.Use functions or a dictionary to avoid repetitive if-elif statements.

Code#1:

```python
def rectangle_area(x, y):
    return x * y

def square_area(x):
    return x * x

def circle_area(x):
    return 3.14 * x * x

area_functions = {
    "rectangle": rectangle_area,
    "square": square_area,
    "circle": circle_area
}

def calculate_area(shape, x, y=None):
    if shape in area_functions:
        if shape == "rectangle":
            return area_functions[shape](x, y)
        else:
            return area_functions[shape](x)
    else:
        return "Invalid shape"
shape = input("Enter the shape (rectangle, square, or circle): ")
if shape.lower() == "rectangle":
    x = float(input("Enter the length: "))
    y = float(input("Enter the width: "))
    result = calculate_area(shape.lower(), x, y)
    print(f"The area of the rectangle is: {result}")
elif shape.lower() == "square":
    x = float(input("Enter the side length: "))
    result = calculate_area(shape.lower(), x)
    print(f"The area of the square is: {result}")
elif shape.lower() == "circle":
    x = float(input("Enter the radius: "))
    result = calculate_area(shape.lower(), x)
    print(f"The area of the circle is: {result}")
else:
    result = calculate_area(shape.lower(), None) # Call with None to get "Invalid shape"
    print(result)
```

```
Enter the shape (rectangle, square, or circle): circle
Enter the radius: 23
The area of the circle is: 1661.06
```

Task Description #2 – Error Handling in Legacy Code
Task: Legacy function without proper error handling

Python Code

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

Expected Output:
AIrefactorswithwith open() and try-except:

Prompt#2:
Refactorthis legacy function to safely read a file using with open() and

~~add try-~~except error handling.
Code#2:

```
def read_file(filename):
    try:
        f = open(filename, "r")
        data = f.read()
        f.close()
        return data
    except FileNotFoundError:
        return f"Error: The file '{filename}' was not found."
    except IOError:
        return f"Error: Could not read the file '{filename}'."
filename = input("Enter the filename to read: ")
file_content = read_file(filename)
print(file_content)
```

```
Enter the filename to read: /content/New Text Document.txt
yes ram is aggi
```

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

Prompt#3: Refactor the given Student class to improve readability and modularity by using clear variable names (name, age, marks), adding docstrings, improving print statements, and using sum(self.marks).

Code#3:

```
class Student:
    """Represents a student with name, age, and three marks."""
    def __init__(self, n: str, a: int, m1: int, m2: int, m3: int):
        """Initializes a Student object.

        Args:
            n: The name of the student.
            a: The age of the student.
            m1: The first mark.
            m2: The second mark.
            m3: The third mark.
        """
        self.n = n # Student's name
        self.a = a # Student's age
        self.m1 = m1 # Mark 1
        self.m2 = m2 # Mark 2
        self.m3 = m3 # Mark 3

    def details(self) -> None:
        """Prints the name and age of the student."""
        print("Name:", self.n, "Age:", self.a)

    def total(self) -> int:
        """Calculates the total marks of the student."""
        return self.m1 + self.m2 + self.m3
    # Get user input for student details
name = input("Enter student name: ")
age = int(input("Enter student age: "))
mark1 = int(input("Enter mark 1: "))
mark2 = int(input("Enter mark 2: "))
mark3 = int(input("Enter mark 3: "))

# Create a Student object
student1 = Student(name, age, mark1, mark2, mark3)

# Display student details and total marks
student1.details()
print("Total Marks:", student1.total())
```

```
Enter student name: ram charan
Enter student age: 23
Enter mark 1: 8
Enter mark 2: 23
Enter mark 3: 30
Name: ram charan  Age: 23
Total Marks: 61
```

Task Description #4 – Inefficient Loop Refactoring

Task: Refactor thisinefficientloopwithAIhelp

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 alist comprehension

Prompt#4:

Generate a the code and refactor the given loop to use a list comprehension for better readability and efficiency.

Code#4:

```
nums_str = input("Enter a list of numbers separated by commas: ")
nums = [int(x) for x in nums_str.split(',')]
squares = [i * i for i in nums]
print(squares)
```

```
Enter a list of numbers separated by commas: 1,2,3
[1, 4, 9]
```