SCHOOL OF COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE		DEPARTMENT OF COMPUTER SCIENCE ENGINEERING	
Program Name: B. Tech		**Assignment Type: Lab**	**Academic Year:**2025-2026
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Course Code	24CS002PC215	**Course Title**	AI Assisted Coding
Year/Sem	II/I	**Regulation**	R24
Date and Day of Assignment	Week5 - Thursday	**Time(s)**	
Duration	2 Hours	**Applicable to Batches**	
AssignmentNumber:10.4(Present assignment number)/**24**(Total number of assignments)			

Q.No.	Question	*Expected Time to complete*
1	**Lab 10 – Code Review and Quality: Using AI to Improve Code Quality and Readability** **Lab Objectives** • Use AI for automated code review and quality enhancement. • Identify and fix syntax, logical, performance, and security issues in Python code. • Improve readability and maintainability through structured refactoring and comments.	Week5 - Thursday

- Apply prompt engineering for targeted improvements.
- Evaluate AI-generated suggestions against PEP 8 standards and software engineering best practices

Task 1: Syntax and Error Detection

Task: Identify and fix syntax, indentation, and variable errors in the given script.

```
# buggy_code_task1.py
def add_numbers(a, b)
   result = a + b
   return reslt
print(add_numbers(10 20))
```

Expected Output:

- Corrected code with proper syntax (: after function, fixed variable name, corrected function call).

```
# buggy_code_task1.py
def add_numbers(a, b):
    result = a + b
    return result

print(add_numbers(10, 20))
```

```
30
```

- AI should explain what was fixed.

Gemini

```
# buggy_code_task1.py
def add_numbers(a, b):
    result = a + b
-   return reslt
+   return result

-print(add_numbers(10 20))
+print(add_numbers(10, 20))
```

```
  File "/tmp/ipython-input-2010739530.py", line 6
    print(add_numbers(10 20))
                         ^
SyntaxError: invalid syntax. Perhaps you forgot a comma?
```

Syntax Error: A colon : was added at the end of the function definition line def add_numbers(a, b). In Python, function definitions must end with a colon.

Indentation Error: The lines inside the function (result = a + b and return result) were not properly indented. In Python, indentation is crucial for defining code blocks. They should be indented with four spaces or one tab under the function definition.

Variable Error: The variable name reslt in the return statement was misspelled. It was corrected to result to match the variable where the sum is stored.

Syntax Error: The function call print(add_numbers(10 20)) was missing a comma between the arguments 10 and 20. A comma is

required to separate arguments in a function call.

Task 2: Logical and Performance Issue Review

Task: Optimize inefficient logic while keeping the result correct.

```
# buggy_code_task2.py
def find_duplicates(nums):
    duplicates = []
    for i in range(len(nums)):
        for j in range(len(nums)):
            if i != j and nums[i] == nums[j] and nums[i] not in duplicates:
                duplicates.append(nums[i])
    return duplicates
numbers = [1,2,3,2,4,5,1,6,1,2]
print(find_duplicates(numbers))
```

Expected Output:

- More efficient duplicate detection (e.g., using sets).

[20]
✓ 0s

```
def find_duplicates(nums):
    seen = set()
    duplicates = set()
    for num in nums:
        if num in seen:
            duplicates.add(num)
        seen.add(num)
    return list(duplicates)

numbers = [1,2,3,2,4,5,1,6,1,2]
print(find_duplicates(numbers))
```

```
[1, 2]
```

- AI should explain the optimization.

Initialize two sets: seen and duplicates: The seen set will keep track of all the numbers we've encountered so far. The duplicates set will store the numbers that are found to be duplicates.

Iterate through the list once: The code goes through the nums list just one time.

Check for duplicates using the seen set: For each number in the list, it checks if the number is already in the seen set.

If the number is in seen, it means we've seen this number before, so it's a duplicate. We add this number to the duplicates set.

If the number is not in seen, it means this is the first time we're seeing this number. We add it to the seen set.

Return the duplicates: Finally, the code converts the duplicates set back into a list and returns it.

Task 3: Code Refactoring for Readability

Task: Refactor messy code into clean, PEP 8–compliant, well-structured code.

```
# buggy_code_task3.py

def c(n):
 x=1
 for i in range(1,n+1):
  x=x*i
 return x
print(c(5))
```

Expected Output:

Function renamed to calculate_factorial.

Proper indentation, variable naming, docstrings, and formatting.

AI should provide a more readable version.

```
def c(n):
 x=1
 for i in range(1,n+1):
  x=x*i
 return x
print(c(5))
```

```
120
```

```
def calculate_factorial(n):
    """
    Calculates the factorial of a non-negative integer.

    Args:
        n: A non-negative integer.

    Returns:
        The factorial of n.
    """
    # Initialize the result to 1
    factorial_result = 1
    # Iterate from 1 to n (inclusive)
    for i in range(1, n + 1):
        # Multiply the result by the current number in the loop
        factorial_result = factorial_result * i
    return factorial_result

# Calculate and print the factorial of 5
print(calculate_factorial(5))
```

```
120
```

Task 4: Security and Error Handling Enhancement

Task: Add security practices and exception handling to the code.

```
# buggy_code_task4.py
import sqlite3
```

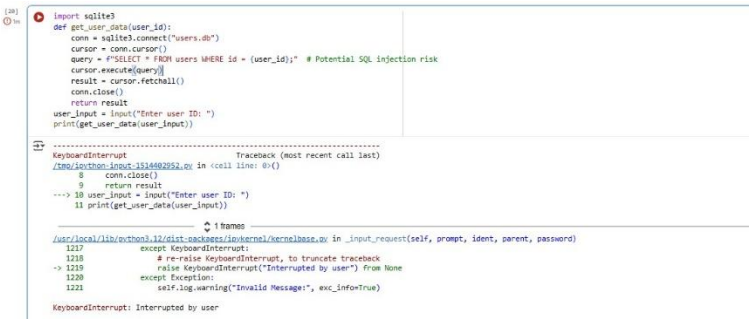
```
def get_user_data(user_id):
    conn = sqlite3.connect("users.db")
    cursor = conn.cursor()
    query = f"SELECT * FROM users WHERE id = {user_id};"  # Potential SQL injection risk
    cursor.execute(query)
    result = cursor.fetchall()
    conn.close()
    return result
user_input = input("Enter user ID: ")
print(get_user_data(user_input))
```

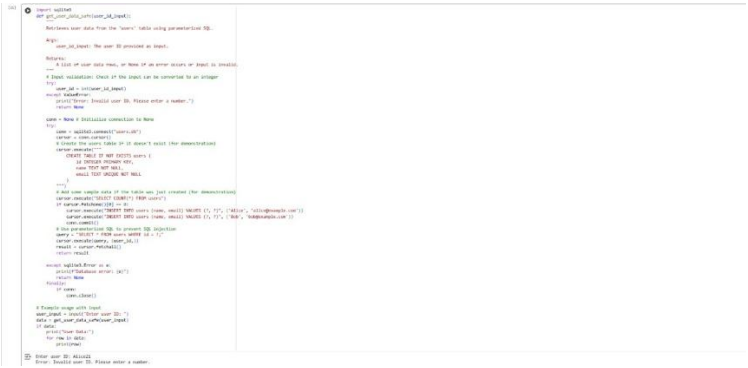
Expected Output:

Safe query using parameterized SQL (? placeholders).

Try-except block for database errors.

Input validation before query execution.





Task 5: Automated Code Review Report Generation

Task: Generate a **review report** for this messy code.

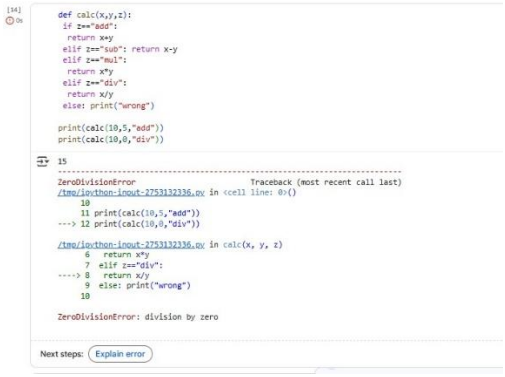
```
# buggy_code_task5.py

def calc(x,y,z):
 if z=="add":
  return x+y
 elif z=="sub": return x-y
 elif z=="mul":
  return x*y
 elif z=="div":
  return x/y
 else: print("wrong")

print(calc(10,5,"add"))
print(calc(10,0,"div"))
```

Expected Output:

AI-generated **review report** should mention:

- Missing docstrings
- Inconsistent formatting (indentation, inline return)
- Missing error handling for division by zero
- Non-descriptive function/variable names
- Suggestions for readability and PEP 8 compliance
- 

```python
def calculate(num1, num2, operation):
    """
    Performs basic arithmetic operations based on the provided operation string.

    Args:
        num1: The first number.
        num2: The second number.
        operation: A string representing the operation ('add', 'sub', 'mul', 'div').

    Returns:
        The result of the operation, or a string indicating an error.
    """
    if operation == "add":
        return num1 + num2
    elif operation == "sub":
        return num1 - num2
    elif operation == "mul":
        return num1 * num2
    elif operation == "div":
        if num2 == 0:
            return "Error: Division by zero is not allowed."
        return num1 / num2
    else:
        return "Error: Invalid operation."

print(calculate(10, 5, "add"))
print(calculate(10, 0, "div"))
print(calculate(10, 5, "mul"))
print(calculate(10, 5, "sub"))
print(calculate(10, 5, "mod")) # Example of an invalid operation
```

```
15
Error: Division by zero is not allowed.
50
5
Error: Invalid operation.
```