

SCHOOL OF COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE		DEPARTMENT OF COMPUTER SCIENCE ENGINEERING	
Program Name: M. Tech/MCA		Assignment Type: Lab	
Course Coordinator Name		Venkataramana Veeramsetty	
Course Code		Course Title	AI Assisted Problem Solving Using Python
Year/Sem		Regulation	R24
Date and Day of Assignment		Time(s)	
Duration		Applicable to Batches	M. Tech/MCA
AssignmentNumber: 5.3(Present assignment number)/24(Total number of assignments)			
Q.No.	Question		
1	<p>Lab 5: Ethical Foundations – Responsible AI Coding Practices</p> <p>Lab Objectives:</p> <ul style="list-style-type: none"> • To explore the ethical risks associated with AI-generated code. • To recognize issues related to security, bias, transparency, and copyright. • To reflect on the responsibilities of developers when using AI tools in software development. • To promote awareness of best practices for responsible and ethical AI coding. <p>Lab Outcomes (LOs):</p> <p>After completing this lab, students will be able to:</p> <ul style="list-style-type: none"> • Identify and avoid insecure coding patterns generated by AI tools. • Detect and analyze potential bias or discriminatory logic in AI-generated outputs. • Evaluate originality and licensing concerns in reused AI-generated code. • Understand the importance of explainability and transparency in AI-assisted programming. • Reflect on accountability and the human role in ethical AI coding practices. 		

	<p>Task Description#1 (Privacy and Data Security)</p> <ul style="list-style-type: none"> • Generate a login system using an AI tool. Analyze if the AI inserts hardcoded credentials or insecure logic. <p>Expected Output#1</p> <ul style="list-style-type: none"> • Description of risks and revised secure version <p>Task Description#2 (Bias)</p> <ul style="list-style-type: none"> • Use prompt variations like “loan approval system” with different genders/names. Analyze if AI suggests biased logic. <p>Expected Output#2</p> <ul style="list-style-type: none"> • Identification of bias (if any) and mitigation ideas <p>Task Description#3 (Transparency)</p> <ul style="list-style-type: none"> • Write prompt to write function calculate the nth Fibonacci number using recursion and generate comments and explain code document <p>Expected Output#3</p> <ul style="list-style-type: none"> • Code with explanation • Assess: Is the explanation understandable and correct? <p>Task Description#4 (Bias)</p> <ul style="list-style-type: none"> • Ask AI to generate a scoring system for job applicants based on features. <p>Expected Output#4</p> <ul style="list-style-type: none"> • Python code • Analyze is there any bias with respect to gender or any <p>Task Description#5 (Inclusiveness)</p> <ul style="list-style-type: none"> • Code Snippet <pre>def greet_user(name, gender): if gender.lower() == "male": title = "Mr." else: title = "Mrs." return f"Hello, {title} {name}! Welcome."</pre> <p>Expected Output#5</p> <ul style="list-style-type: none"> • Regenerate code that includes gender-neutral also <p>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</p> <p>Evaluation Criteria:</p> <table border="1"> <thead> <tr> <th>Criteria</th><th>Max Marks</th></tr> </thead> <tbody> <tr> <td>Transparency</td><td>2.5</td></tr> <tr> <td>Bias</td><td>2.5</td></tr> </tbody> </table>	Criteria	Max Marks	Transparency	2.5	Bias	2.5
Criteria	Max Marks						
Transparency	2.5						
Bias	2.5						

	Inclusiveness	2.5		
	Data security and Privacy	2.5		
	Total	10		

Task Description#1

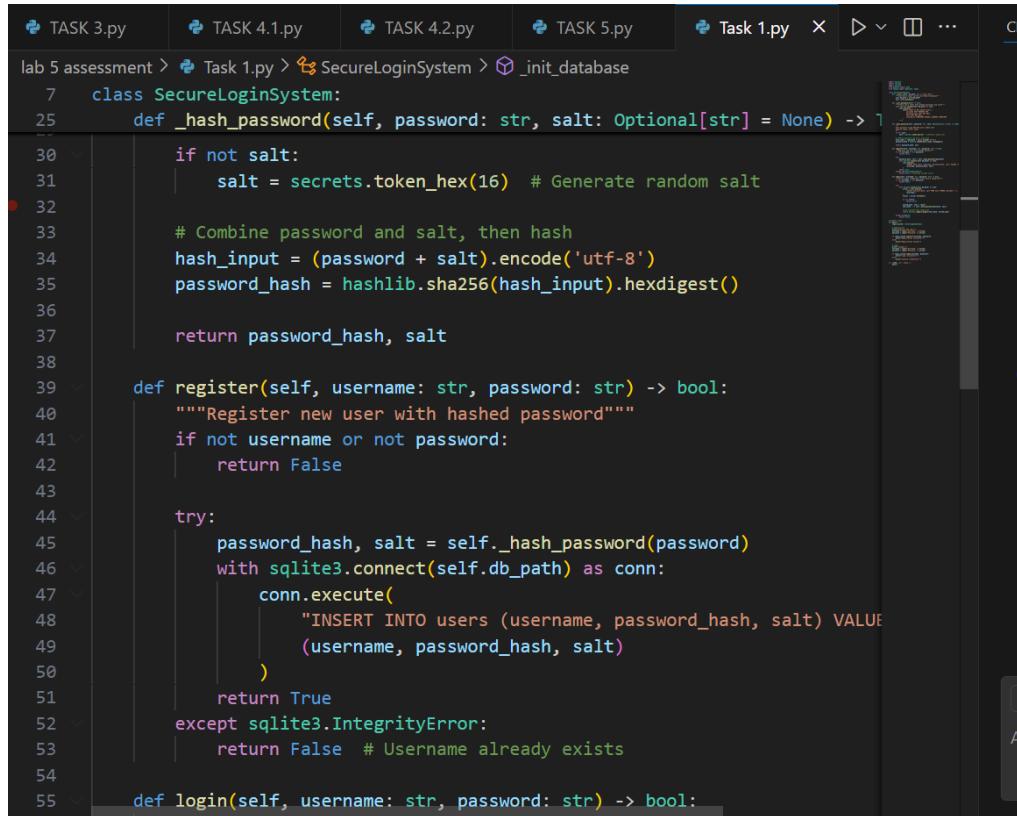
(Privacy and Data Security)

Generate a login system using an AI tool. Analyze if the AI inserts hardcoded credentials or insecure logic

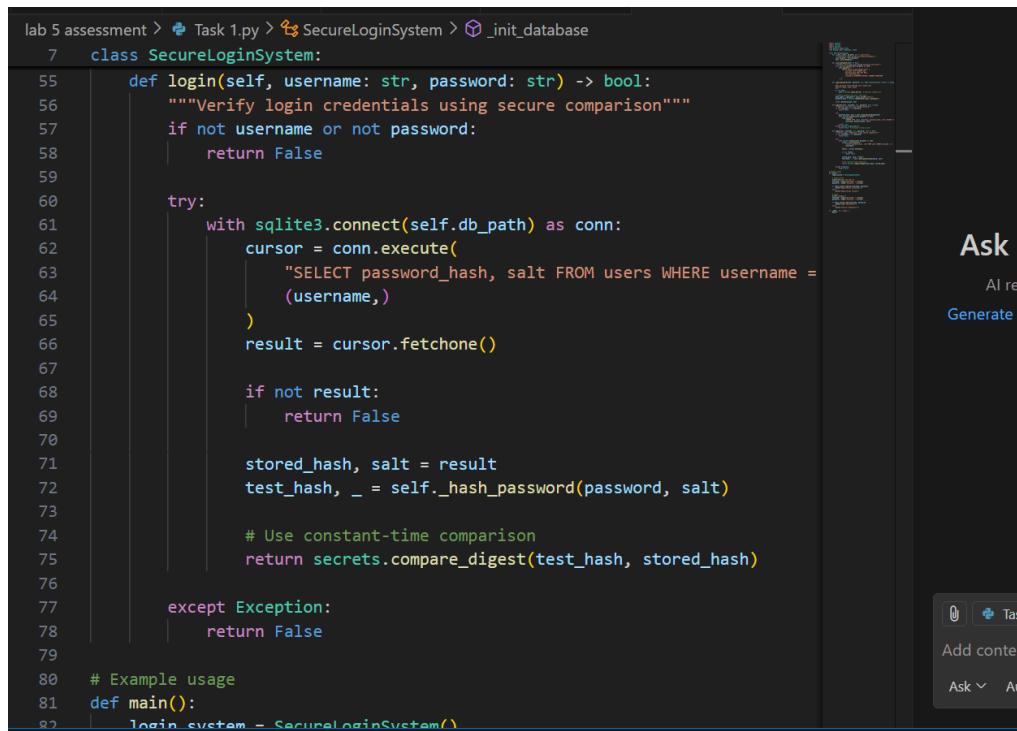
PROMPT: Create a secure Python login system without hardcoded passwords. Use password hashing and explain how it protects data.

```
lab 5 assessment > 🗂 Task 1.py > 🗃 SecureLoginSystem > ⚙ _init_database
1  import hashlib
2  import secrets
3  import sqlite3
4  from pathlib import Path
5  from typing import Optional, Tuple
6
7  class SecureLoginSystem:
8      def __init__(self, db_path: str = "users.db"):
9          """Initialize login system with SQLite database"""
10         self.db_path = Path(db_path)
11         self._init_database()
12
13     def _init_database(self) -> None:
14         """Create users table with hashed passwords and salts"""
15         with sqlite3.connect(self.db_path) as conn:
16             conn.execute("""
17                 CREATE TABLE IF NOT EXISTS users (
18                     username TEXT PRIMARY KEY,
19                     password_hash TEXT NOT NULL,
20                     salt TEXT NOT NULL,
21                     created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP
22                 )
23             """)
24
25     def _hash_password(self, password: str, salt: Optional[str] = None) -> Tuple[bytes, bytes]:
26         """
27             Hash password using SHA-256 with random salt
28             Returns (hash, salt) tuple
29         """

```



```
lab 5 assessment > Task 1.py > SecureLoginSystem > __init_database
7   class SecureLoginSystem:
25     def _hash_password(self, password: str, salt: Optional[str] = None) -> Tuple[bytes, bytes]:
30       if not salt:
31         salt = secrets.token_hex(16) # Generate random salt
32
33       # Combine password and salt, then hash
34       hash_input = (password + salt).encode('utf-8')
35       password_hash = hashlib.sha256(hash_input).hexdigest()
36
37     return password_hash, salt
38
39   def register(self, username: str, password: str) -> bool:
40     """Register new user with hashed password"""
41     if not username or not password:
42       return False
43
44     try:
45       password_hash, salt = self._hash_password(password)
46       with sqlite3.connect(self.db_path) as conn:
47         conn.execute(
48           "INSERT INTO users (username, password_hash, salt) VALUES (?, ?, ?)",
49           (username, password_hash, salt)
50         )
51       return True
52     except sqlite3.IntegrityError:
53       return False # Username already exists
54
55   def login(self, username: str, password: str) -> bool:
```



```
lab 5 assessment > Task 1.py > SecureLoginSystem > __init_database
7   class SecureLoginSystem:
55     def login(self, username: str, password: str) -> bool:
56       """Verify login credentials using secure comparison"""
57       if not username or not password:
58         return False
59
60       try:
61         with sqlite3.connect(self.db_path) as conn:
62           cursor = conn.execute(
63             "SELECT password_hash, salt FROM users WHERE username = ?",
64             (username,)
65           )
66           result = cursor.fetchone()
67
68           if not result:
69             return False
70
71           stored_hash, salt = result
72           test_hash, _ = self._hash_password(password, salt)
73
74           # Use constant-time comparison
75           return secrets.compare_digest(test_hash, stored_hash)
76
77       except Exception:
78         return False
79
80   # Example usage
81   def main():
82     login_system = SecureLoginSystem()
```

```
lab 5 assessment > Task 1.py > SecureLoginSystem > _init_database
81  def main():
83
84      # Registration
85      print("Register new user:")
86      username = input("Username: ").strip()
87      password = input("Password: ").strip()
88
89      if login_system.register(username, password):
90          print("Registration successful!")
91      else:
92          print("Registration failed!")
93
94      # Login
95      print("\nLogin:")
96      username = input("Username: ").strip()
97      password = input("Password: ").strip()
98
99      if login_system.login(username, password):
100         print("Login successful!")
101     else:
102         print("Invalid credentials!")
103
104 if __name__ == "__main__":
105     main()
```

Expected Output#1

- Description of risks and revised secure version

Practical Output:

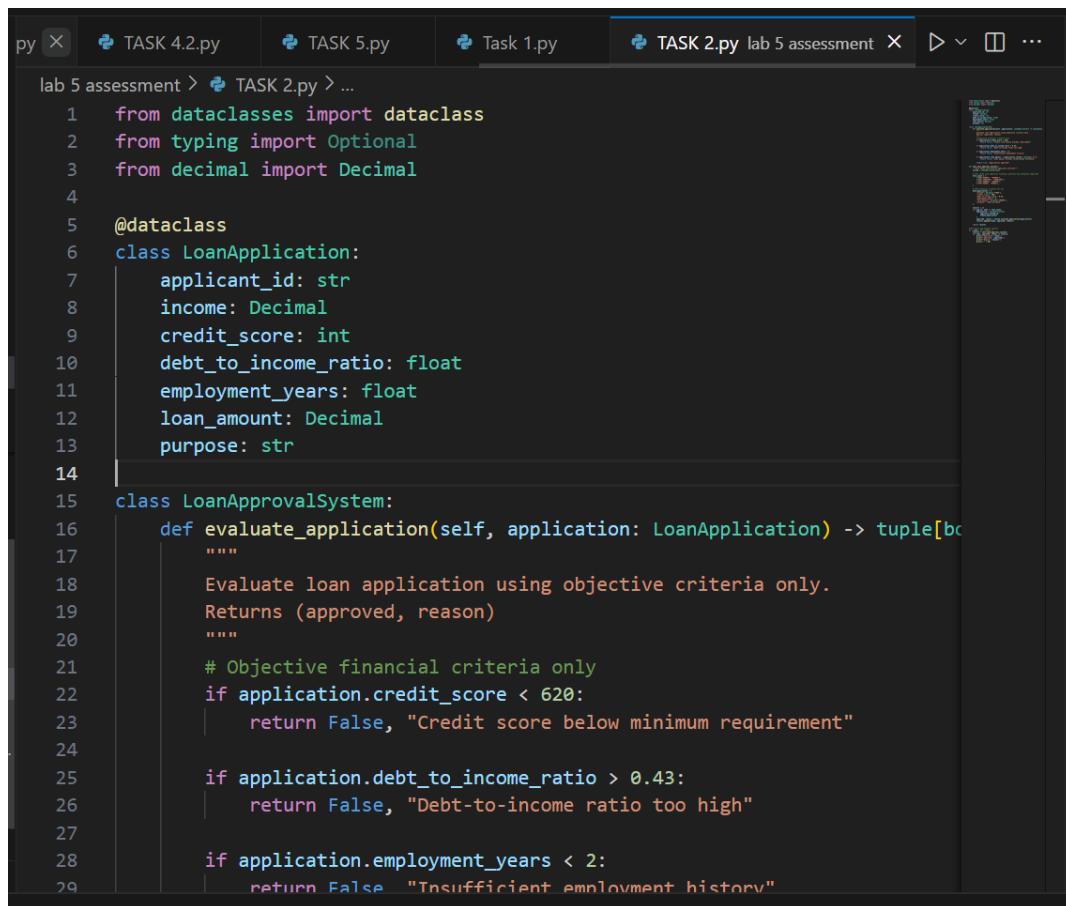
```
● PS C:\Users\rimsha\OneDrive\Desktop\rimsha python assessment> python -u "c:\Users\rimsha\OneD
rive\Desktop\rimsha python assessment\tempCodeRunnerFile.python"
Register new user:
Username: RAHIMATHUNNISA RIMSHA
Password: Rimsha@123
Registration successful!

Login:
Username: RAHIMATHUNNISA RIMSHA
Password: Rimsha@123
Login successful!
❖ PS C:\Users\rimsha\OneDrive\Desktop\rimsha python assessment>
```

Task Description#2 (Bias)

- Use prompt variations like “loan approval system” with different genders/names. Analyze if AI suggests biased logic.

PROMPT: Generate a loan approval scoring system. Do **not** use gender or name as factors. Explain how this avoids bias.”



The screenshot shows a code editor window with several tabs at the top: 'py' (closed), 'TASK 4.2.py' (closed), 'TASK 5.py' (closed), 'Task 1.py' (closed), 'TASK 2.py lab 5 assessment' (active), and a '...' tab. The main area displays the following Python code:

```
lab 5 assessment > TASK 2.py > ...
1  from dataclasses import dataclass
2  from typing import Optional
3  from decimal import Decimal
4
5  @dataclass
6  class LoanApplication:
7      applicant_id: str
8      income: Decimal
9      credit_score: int
10     debt_to_income_ratio: float
11     employment_years: float
12     loan_amount: Decimal
13     purpose: str
14
15 class LoanApprovalSystem:
16     def evaluate_application(self, application: LoanApplication) -> tuple[bool, str]:
17         """
18             Evaluate loan application using objective criteria only.
19             Returns (approved, reason)
20         """
21
22         # Objective financial criteria only
23         if application.credit_score < 620:
24             return False, "Credit score below minimum requirement"
25
26         if application.debt_to_income_ratio > 0.43:
27             return False, "Debt-to-income ratio too high"
28
29         if application.employment_years < 2:
30             return False, "Insufficient employment history"
```

The image shows two side-by-side screenshots of a code editor interface, likely PyCharm, displaying Python code related to a loan approval system.

Top Screenshot:

```
lab 5 assessment > TASK 2.py > ...
15     class LoanApprovalSystem:
16         def evaluate_application(self, application: LoanApplication) -> tuple[bool, str]:
17             ...
18             if application.loan_amount > (application.income * Decimal('3')):
19                 return False, "Loan amount exceeds income-based threshold"
20             ...
21             return True, "Application approved"
22 
23     def test_loan_approval_system():
24         """Test cases with diverse applicant profiles"""
25         system = LoanApprovalSystem()
26 
27         # Test cases with identical financial profiles but different names/IDs
28         test_cases = [
29             ("APPL-RIMSHA", "RIMSHA"),
30             ("APPL-CHARITHA", "CHARITHA"),
31             ("APPL-SUBHAN", "SUBHAN"),
32             ("APPL-FAHAD", "FAHAD"),
33         ]
34 
35         # Same financial criteria for all
36         base_application = {
37             "income": Decimal('75000'),
38             "credit_score": 700,
39             "debt_to_income_ratio": 0.35,
40             "employment_years": 3,
41             "loan_amount": Decimal('200000'),
42             "purpose": "Home purchase"
43         }
```

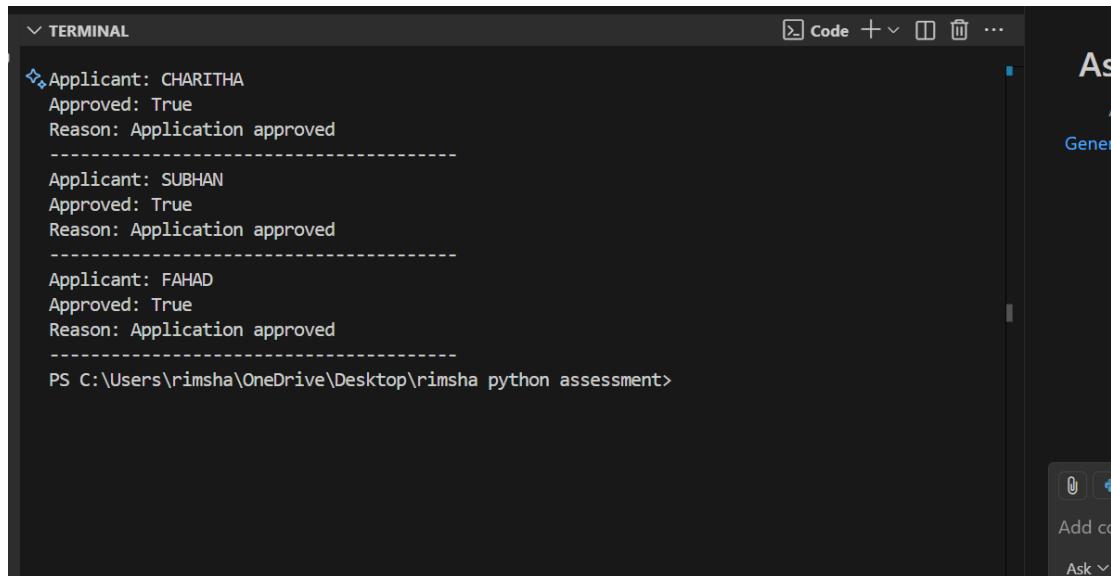
Bottom Screenshot:

```
lab 5 assessment > TASK 2.py > ...
36     def test_loan_approval_system():
37         """Test cases with diverse applicant profiles"""
38         system = LoanApprovalSystem()
39 
40         # Test cases with identical financial profiles but different names/IDs
41         test_cases = [
42             ("APPL-RIMSHA", "RIMSHA"),
43             ("APPL-CHARITHA", "CHARITHA"),
44             ("APPL-SUBHAN", "SUBHAN"),
45             ("APPL-FAHAD", "FAHAD"),
46         ]
47 
48         # Same financial criteria for all
49         base_application = {
50             "income": Decimal('75000'),
51             "credit_score": 700,
52             "debt_to_income_ratio": 0.35,
53             "employment_years": 3,
54             "loan_amount": Decimal('200000'),
55             "purpose": "Home purchase"
56         }
57 
58         results = []
59         for app_id, name in test_cases:
60             application = LoanApplication(
61                 applicant_id=app_id,
62                 **base_application
63             )
64             approved, reason = system.evaluate_application(application)
65             results.append((name, approved, reason))
66 
67         return results
68 
69     # Run tests and display results
70     if __name__ == "__main__":
71         results = test_loan_approval_system()
72         for name, approved, reason in results:
73             print(f"Applicant: {name}")
74             print(f"Approved: {approved}")
75             print(f"Reason: {reason}")
76             print("-" * 40)
```

Expected Output#2

- Identification of bias (if any) and mitigation ideas

Practical Output:



The screenshot shows a terminal window with the title 'TERMINAL' at the top left. The window contains the following text output:

```
❖ Applicant: CHARITHA
Approved: True
Reason: Application approved
-----
Applicant: SUBHAN
Approved: True
Reason: Application approved
-----
Applicant: FAHAD
Approved: True
Reason: Application approved
-----
PS C:\Users\rimsha\OneDrive\Desktop\rimsha python assessment>
```

The terminal interface includes standard Windows-style icons for file operations (New, Open, Save, etc.) and a menu bar with 'Code', '+', and other options.

Task Description#3 (Transparency)

- Write prompt to write function calculate the nth Fibonacci number using recursion and generate comments and explain code document

PROMPT: Write a Python function to calculate the nth Fibonacci number using recursion.

The image shows a code editor interface with two tabs visible at the top: "ASK 5.py" and "Task 1.py". The active tab is "TASK 3.py lab 5 assessment". Below the tabs, there are two code snippets. The top snippet is a complete Python script for calculating the nth Fibonacci number using recursion. It includes a docstring, input validation, base cases, and a recursive case. The bottom snippet is a simplified version of the main function from the top snippet, likely a part of a larger program or a different task.

```
def fibonacci(n: int) -> int:
    """Calculate the nth Fibonacci number using recursion."""
    # Input validation
    if not isinstance(n, int):
        raise TypeError("Input must be an integer")
    if n < 0:
        raise ValueError("Input must be non-negative")

    # Base cases
    if n == 0:
        return 0
    if n == 1:
        return 1
    # Recursive case
    return fibonacci(n - 1) + fibonacci(n - 2)

def main():
    try:
        # Get input from user
        n = int(input("Enter a number to find its Fibonacci value: "))
        # Calculate and display result
        result = fibonacci(n)
        print(f"F({n}) = {result}")

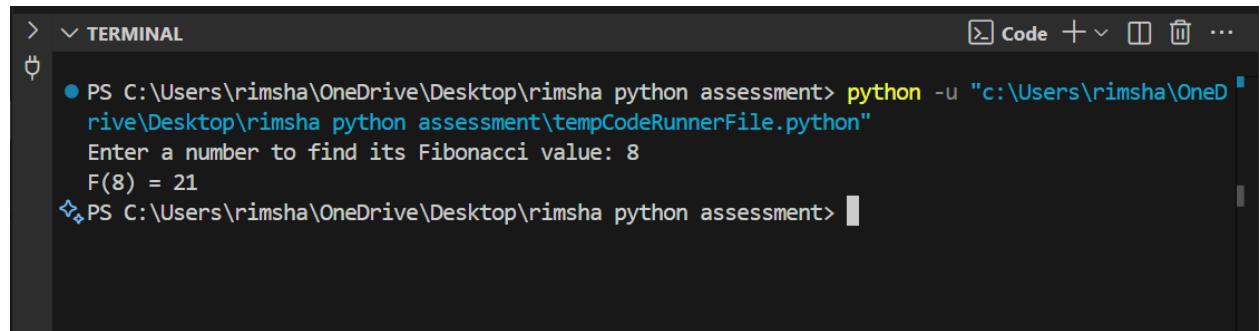
    except ValueError as e:
        print("Please enter a valid non-negative integer")
    except Exception as e:
        print(f"Error: {e}")

if __name__ == "__main__":
    main()
```

Expected Output#3

- Code with explanation

Practical Output:

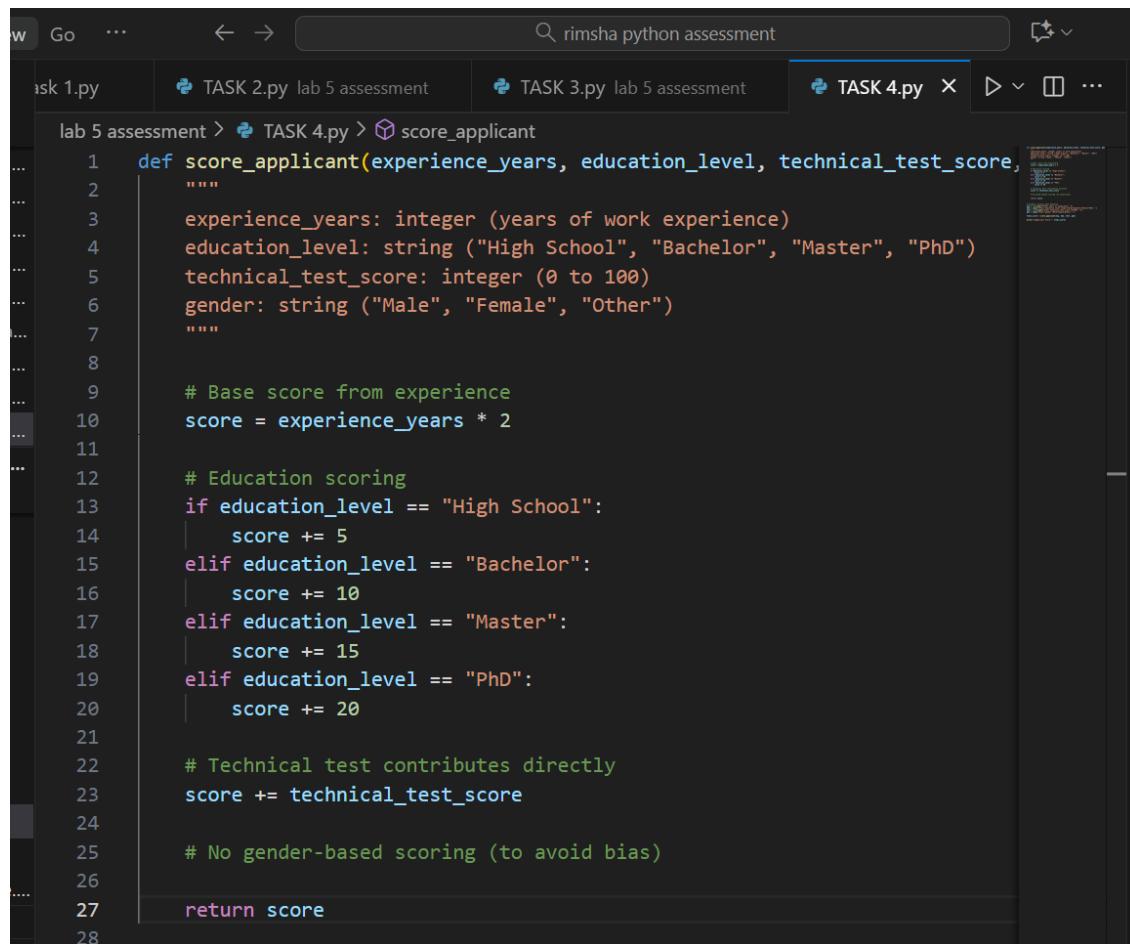


A screenshot of a terminal window titled "TERMINAL". The command entered is "python -u "c:\Users\rimsha\OneDrive\Desktop\rimsha python assessment\tempCodeRunnerFile.python"" followed by "Enter a number to find its Fibonacci value: 8". The output shows "F(8) = 21". The terminal interface includes tabs for "Code" and "Terminal", and a status bar at the bottom.

Task Description#4 (Bias)

- Ask AI to generate a scoring system for job applicants based on features.

PROMPT: generate a scoring system for job applicants based on features.



A screenshot of a code editor showing a Python file named "TASK 4.py". The code defines a function "score_applicant" with parameters: experience_years, education_level, technical_test_score, gender. The function calculates a base score from experience (experience_years * 2), adds points for education level (High School: +5, Bachelor: +10, Master: +15, PhD: +20), and adds the technical test score. A comment indicates "No gender-based scoring (to avoid bias)". The code editor has tabs for "task 1.py", "TASK 2.py lab 5 assessment", "TASK 3.py lab 5 assessment", and "TASK 4.py".

```
def score_applicant(experience_years, education_level, technical_test_score, gender):
    """
    experience_years: integer (years of work experience)
    education_level: string ("High School", "Bachelor", "Master", "PhD")
    technical_test_score: integer (0 to 100)
    gender: string ("Male", "Female", "Other")
    """

    # Base score from experience
    score = experience_years * 2

    # Education scoring
    if education_level == "High School":
        score += 5
    elif education_level == "Bachelor":
        score += 10
    elif education_level == "Master":
        score += 15
    elif education_level == "PhD":
        score += 20

    # Technical test contributes directly
    score += technical_test_score

    # No gender-based scoring (to avoid bias)

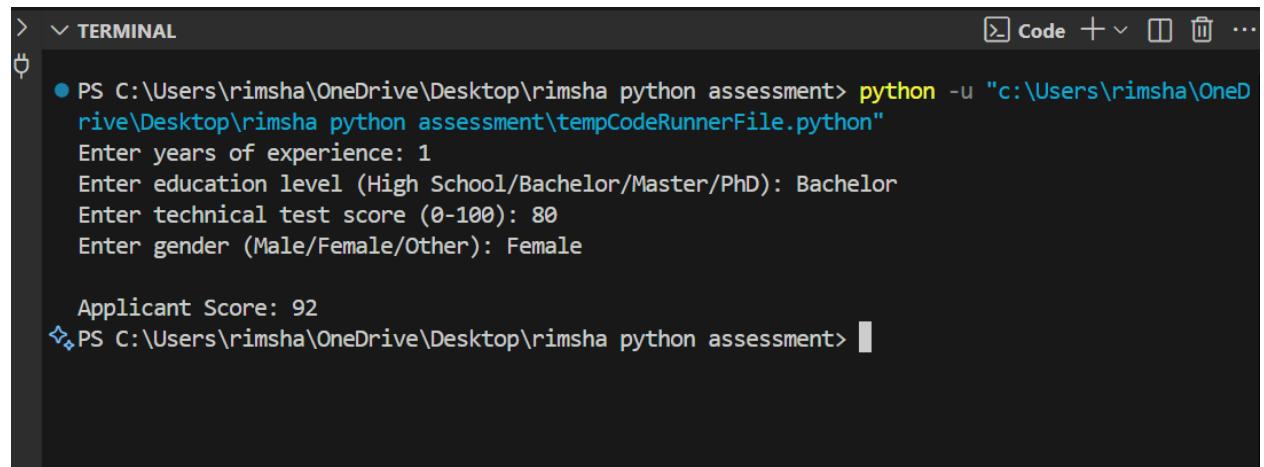
    return score
```

```
24
25     # No gender-based scoring (to avoid bias)
26
27     return score|
28
29
30 # Example: Giving input manually
31 exp = int(input("Enter years of experience: "))
32 edu = input("Enter education level (High School/Bachelor/Master/PhD): ")
33 test = int(input("Enter technical test score (0-100): "))
34 gen = input("Enter gender (Male/Female/Other): ")
35
36 final_score = score_applicant(exp, edu, test, gen)
37
38 print("\nApplicant Score:", final_score)
```

Expected Output#4

- Python code
- Analyze is there any bias with respect to gender or any

Practical Output:



The screenshot shows a terminal window with the following content:

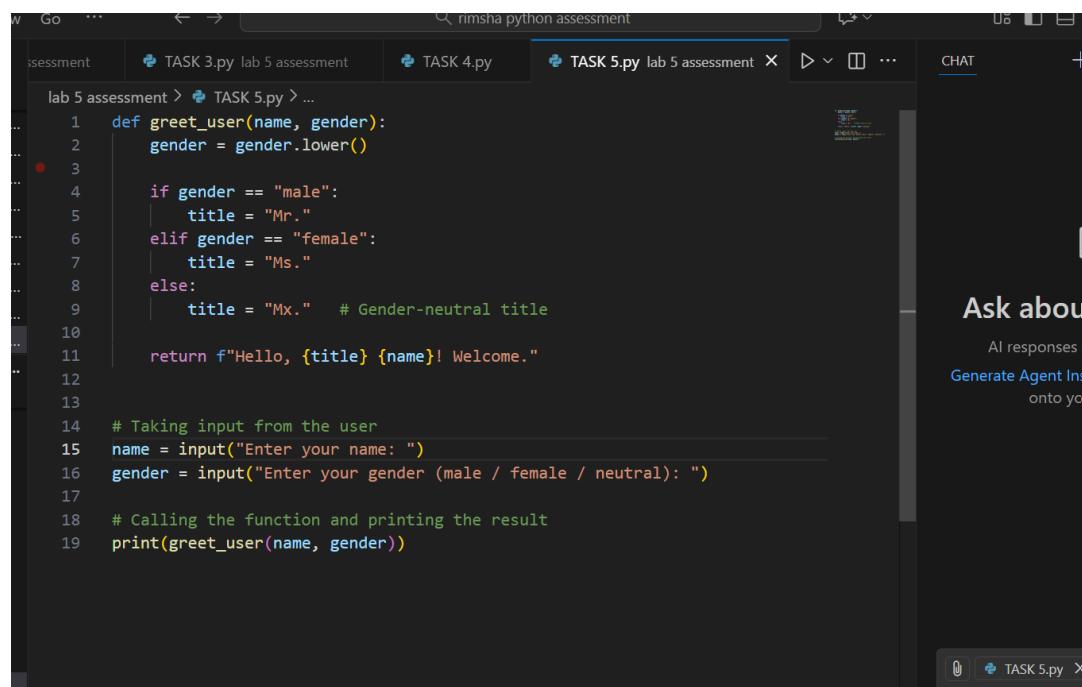
```
> ▾ TERMINAL
ψ ● PS C:\Users\rimsha\OneDrive\Desktop\rimsha python assessment> python -u "c:\Users\rimsha\OneDrive\Desktop\rimsha python assessment\tempCodeRunnerFile.py"
Enter years of experience: 1
Enter education level (High School/Bachelor/Master/PhD): Bachelor
Enter technical test score (0-100): 80
Enter gender (Male/Female/Other): Female

Applicant Score: 92
↳ PS C:\Users\rimsha\OneDrive\Desktop\rimsha python assessment>
```

Task Description#5 (Inclusiveness)

- Code Snippet

PROMPT: Regenerate code that includes gender-neutral also.



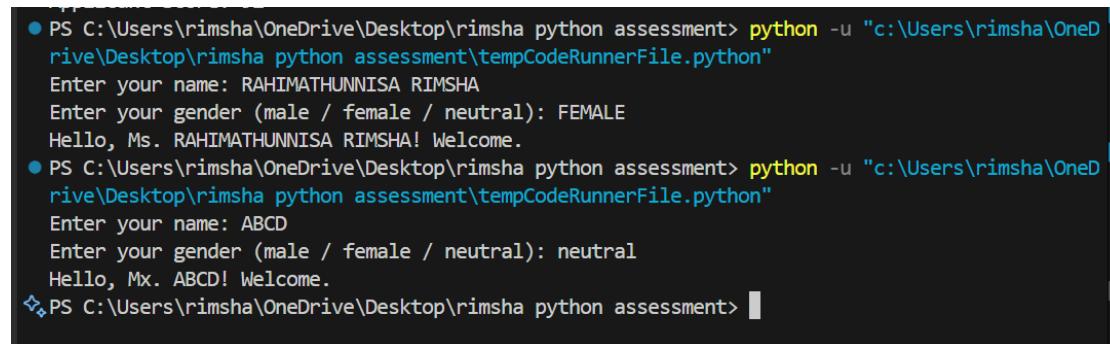
The screenshot shows a code editor window titled "rimsha python assessment". The tab bar has three tabs: "TASK 3.py lab 5 assessment", "TASK 4.py", and "TASK 5.py lab 5 assessment" (which is currently active). The code in the editor is as follows:

```
lab 5 assessment > TASK 5.py > ...
1 def greet_user(name, gender):
2     gender = gender.lower()
3
4     if gender == "male":
5         title = "Mr."
6     elif gender == "female":
7         title = "Ms."
8     else:
9         title = "Mx."    # Gender-neutral title
10
11    return f"Hello, {title} {name}! Welcome."
12
13
14 # Taking input from the user
15 name = input("Enter your name: ")
16 gender = input("Enter your gender (male / female / neutral): ")
17
18 # Calling the function and printing the result
19 print(greet_user(name, gender))
```

Expected Output#5

- Regenerate code that includes **gender-neutral** also

Practical Output:



The screenshot shows a terminal window with two examples of the program's output. The first example uses "RAHIMATHUNNISA RIMSHA" as input, resulting in "Hello, Ms. RAHIMATHUNNISA RIMSHA! Welcome.". The second example uses "ABCD" as input, resulting in "Hello, Mx. ABCD! Welcome.".

```
● PS C:\Users\rimsha\OneDrive\Desktop\rimsha python assessment> python -u "c:\Users\rimsha\OneDrive\Desktop\rimsha python assessment\tempCodeRunnerFile.python"
Enter your name: RAHIMATHUNNISA RIMSHA
Enter your gender (male / female / neutral): FEMALE
Hello, Ms. RAHIMATHUNNISA RIMSHA! Welcome.

● PS C:\Users\rimsha\OneDrive\Desktop\rimsha python assessment> python -u "c:\Users\rimsha\OneDrive\Desktop\rimsha python assessment\tempCodeRunnerFile.python"
Enter your name: ABCD
Enter your gender (male / female / neutral): neutral
Hello, Mx. ABCD! Welcome.
PS C:\Users\rimsha\OneDrive\Desktop\rimsha python assessment>
```

