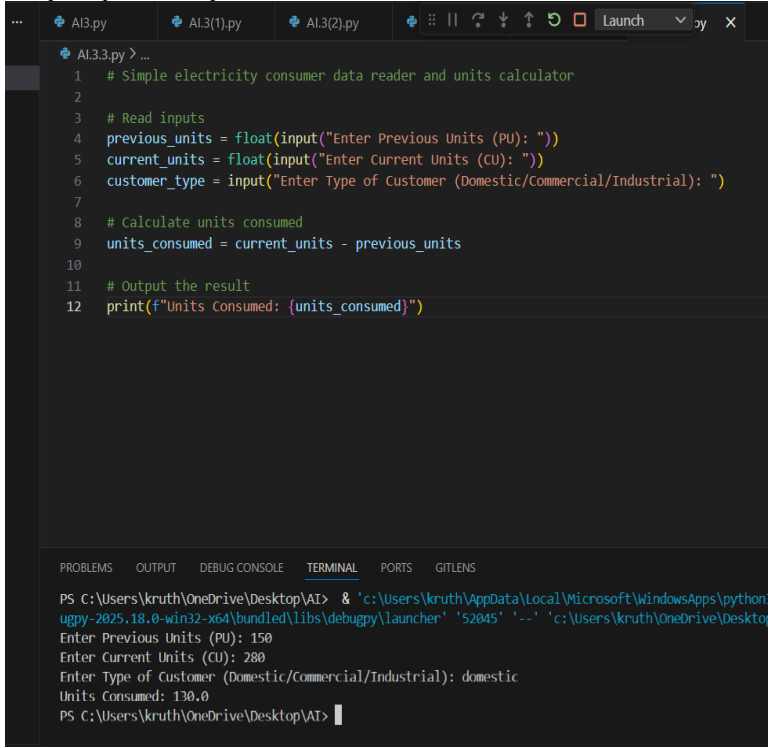


NAME:CH.Kruthankiran

N.NO:2303A51404

BATCH:26

|   |  |  |                        |
|---|--|--|------------------------|
| SCHOOL OF COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE                            |  | DEPARTMENT OF COMPUTER SCIENCE ENGINEERING |                        |
| Program Name: B. Tech   |  | Assignment Type: Lab                       |                        |
|   |  | Academic Year:2025-2026                    |                        |
| Course Coordinator Name   |  | Dr. Rishabh Mittal                         |                        |
| Instructor(s) Name  |  | Mr. S Naresh Kumar                         |                        |
|   |  | Ms. B. Swathi                              |                        |
|   |  | Dr. Sasanko Shekhar Gantayat               |                        |
|   |  | Mr. Md Sallauddin                          |                        |
|   |  | Dr. Mathivanan                             |                        |
|   |  | Mr. Y Srikanth                             |                        |
|   |  | Ms. N Shilpa                               |                        |
|   |  | Dr. Rishabh Mittal (Coordinator)           |                        |
|   |  | Dr. R. Prashant Kumar                      |                        |
|   |  | Mr. Ankushavali MD                         |                        |
|   |  | Mr. B Viswanath                            |                        |
|   |  | Ms. Sujitha Reddy                          |                        |
|   |  | Ms. A. Anitha                              |                        |
|   |  | Ms. M.Madhuri                              |                        |
|   |  | Ms. Katherashala Swetha                    |                        |
|   |  | Ms. Velpula sumalatha                      |                        |
| Mr. Bingi Raju  |  |  |                        |
| Course Code   | 23CS002PC304   | Course Title                               | AI Assisted Coding     |
| Year/Sem  | III/I  | Regulation                                 | R23                    |
| Date and Day of Assignment  | Week 2 - Wednesday   | Time(s)                                    | 23CSBTB01 To 23CSBTB52 |
| Duration  | 2 Hours  | Applicable to Batches                      | All batches            |
| Assignment Number: 3.3(Present assignment number)/24(Total number of assignments) |  |  |                        |
|   |  |  |                        |
| Q.No.   | Question   | Expected Time to complete                  |                        |
| 1   | <b>Lab 3: Application for TGNPDCL – Electricity Bill Generation Using Python &amp; AI Tools</b><br><br><b>Lab Objectives</b> <ul style="list-style-type: none"><li>To design a real-world electricity billing application using Python</li><li>To use AI-assisted coding tools for logic generation and optimization</li><li>To understand conditional logic and arithmetic operations</li></ul> | Week2 - Wednesday                          |                        |

|  |   |  |
|--|---|--|
|  | <ul style="list-style-type: none"> <li>To generate structured billing output similar to utility bills</li> </ul> <p><b>Lab Outcomes (LOs)</b><br/>After completing this lab, students will be able to:</p> <ul style="list-style-type: none"> <li>Read and validate user input in Python</li> <li>Apply conditional logic for tariff-based billing</li> <li>Use AI tools to assist in program development</li> <li>Calculate and display electricity bill components</li> <li>Build a complete real-time application</li> </ul>   |  |
|  | <p><b>Task 1: AI-Generated Logic for Reading Consumer Details</b></p> <p><b>Scenario</b><br/>An electricity billing system must collect accurate consumer data.</p> <p><b>Task Description</b><br/>Use an AI tool (GitHub Copilot / Gemini) to generate a Python program that:</p> <ul style="list-style-type: none"> <li>Reads: <ul style="list-style-type: none"> <li>Previous Units (PU)</li> <li>Current Units (CU)</li> <li>Type of Customer</li> </ul> </li> <li>Calculates units consumed</li> <li>Implements logic directly in the main program (no functions)</li> </ul> <p><b>Expected Output</b></p> <ul style="list-style-type: none"> <li>Correct input reading</li> <li>Units consumed calculation</li> <li>Screenshot showing AI-generated code</li> <li>Sample input and output</li> </ul>  <p>The screenshot displays a Python IDE with a file named 'AI3.3.py'. The code is a simple electricity consumer data reader and units calculator. It prompts the user for previous units, current units, and customer type, then calculates the units consumed (current units minus previous units) and prints the result. The terminal window shows the execution of the program with sample input: previous units 150, current units 280, and customer type 'domestic', resulting in 130.0 units consumed.</p> |  |
|  | <p><b>Task 2: Energy Charges Calculation Based on Units Consumed</b></p> <p><b>Scenario</b><br/>Energy charges depend on the number of units consumed and customer type.</p> <p><b>Task Description</b><br/>Review the AI-generated code from Task 1 and extend it to:</p> <ul style="list-style-type: none"> <li>Calculate <b>Energy Charges (EC)</b></li> </ul>   |  |

- Use conditional statements based on:
  - Domestic
  - Commercial
  - Industrial consumers
- Improve readability using AI prompts such as:
  - *"Simplify energy charge calculation logic"*
  - *"Optimize conditional statements"*

#### Expected Output

- Correct EC calculation
- Clear conditional logic
- Original and improved versions (optional)
- Sample execution results

```

22  elif units_consumed <= 200:
23      ec = 100 * 1.5 + (units_consumed - 100) * 2.5
24  else:
25      ec = 100 * 1.5 + 100 * 2.5 + (units_consumed - 200) * 4.0
26  elif customer_type == "Industrial":
27      if units_consumed <= 100:
28          ec = units_consumed * 2.0
29      elif units_consumed <= 200:
30          ec = 100 * 2.0 + (units_consumed - 100) * 3.0
31      else:
32          ec = 100 * 2.0 + 100 * 3.0 + (units_consumed - 200) * 5.0
33  else:
34      ec = 0 # Invalid type
35      print("Invalid customer type!")
36
37  # Output
38  print(f"Units Consumed: {units_consumed}")
39  print(f"Energy Charges (EC): ${ec:.2f}")

```

```

Units Consumed: 130.0
PS C:\Users\kruth\OneDrive\Desktop\AI> ^C
PS C:\Users\kruth\OneDrive\Desktop\AI>
PS C:\Users\kruth\OneDrive\Desktop\AI> c:; cd 'c:\Users\kruth\OneDrive\Desktop\AI'; & 'c:\Users\kruth\
\Users\kruth\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundle\libs\debugpy\launcher' '(
).py'
Enter Previous Units (PU): 150
Enter Current Units (CU): 280
Enter Type of Customer (Domestic/Commercial/Industrial): domestic
Invalid customer type!
Units Consumed: 130.0
Energy Charges (EC): $0.00
PS C:\Users\kruth\OneDrive\Desktop\AI>

```

### Task 3: Modular Design Using AI Assistance (Using Functions)

#### Scenario

Billing logic must be reusable for multiple consumers.

#### Task Description

Use AI assistance to generate a Python program that:

- Uses user-defined functions to:
  - Calculate Energy Charges
  - Calculate Fixed Charges
- Returns calculated values
- Includes meaningful comments

#### Expected Output

- Function-based Python program
- Correct EC and FC values
- Screenshots of AI-assisted function generation
- Test cases with outputs

```

C:\Users> shash > AAC A (3.3).py > ...
1 # Modular Electricity Billing System
2
3 def calculate_energy_charges(customer_type, units_consumed):
4     """
5     Calculate Energy Charges based on customer type and units consumed.
6     Slabs: Domestic (1/2/3), Commercial (1.5/2.5/4), Industrial (2/3/5) per unit tiers.
7     """
8     if customer_type == "Domestic":
9         if units_consumed <= 100:
10             return units_consumed * 1.0
11         elif units_consumed <= 200:
12             return 100 * 1.0 + (units_consumed - 100) * 2.0
13         else:
14             return 100 * 1.0 + 100 * 2.0 + (units_consumed - 200) * 3.0
15     elif customer_type == "Commercial":
16         if units_consumed <= 100:
17             return units_consumed * 1.5
18         elif units_consumed <= 200:
19             return 100 * 1.5 + (units_consumed - 100) * 2.5
20         else:
21             return 100 * 1.5 + 100 * 2.5 + (units_consumed - 200) * 4.0
22     elif customer_type == "Industrial":
23         if units_consumed <= 100:
24             return units_consumed * 2.0
25         elif units_consumed <= 200:
26             return 100 * 2.0 + (units_consumed - 100) * 3.0
27         else:
28             return 100 * 2.0 + 100 * 3.0 + (units_consumed - 200) * 5.0
29     return 0 # Invalid type
30
31 def calculate_fixed_charges(customer_type):
32     """
33     Calculate Fixed Charges based on customer type.
34     Domestic: $100, Commercial: $200, Industrial: $300.
35     """
36     if customer_type == "Domestic":
37         return 100.0
38     elif customer_type == "Commercial":
39         return 200.0
40     elif customer_type == "Industrial":
41         return 300.0
42     return 0 # Invalid type
43
44 # Main program
45 previous_units = float(input("Enter Previous Units (PU): "))
46 current_units = float(input("Enter Current Units (CU): "))
47 customer_type = input("Enter Type of Customer (Domestic/Commercial/Industrial): ")
48
49 units_consumed = current_units - previous_units
50 ec = calculate_energy_charges(customer_type, units_consumed)
51 fc = calculate_fixed_charges(customer_type)
52
53 print(f"Units Consumed: {units_consumed}")
54 print(f"Energy Charges (EC): ${ec:.2f}")
55 print(f"Fixed Charges (FC): ${fc:.2f}")

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```

sh\AAC A (3.3).py'
Units Consumed: 130.0
Energy Charges (EC): $160.00
PS C:\Users\shasho c; cd 'c:\Users\shash'; & 'c:\Users\shash\anaconda3\envs\Shashidhar\python.exe' 'c:\Users\shash\AAC A (3.3).py'
Enter Previous Units (PU): 150
Enter Current Units (CU): 280
Enter Type of Customer (Domestic/Commercial/Industrial): Domestic
Units Consumed: 130.0
Energy Charges (EC): $160.00
Fixed Charges (FC): $100.00
PS C:\Users\shasho

```

Welcome SubSetSum.java lab - 2.html # lab - 2.css JS lab - 2.js resume dev

```

C:\Users> shash > AAC A (3.3).py > ...
3 def calculate_energy_charges(customer_type, units_consumed):
25     elif units_consumed <= 200:
26         return 100 * 2.0 + (units_consumed - 100) * 3.0
27     else:
28         return 100 * 2.0 + 100 * 3.0 + (units_consumed - 200) * 5.0
29     return 0 # Invalid type
30
31 def calculate_fixed_charges(customer_type):
32     """
33     Calculate Fixed Charges based on customer type.
34     Domestic: $100, Commercial: $200, Industrial: $300.
35     """
36     if customer_type == "Domestic":
37         return 100.0
38     elif customer_type == "Commercial":
39         return 200.0
40     elif customer_type == "Industrial":
41         return 300.0
42     return 0 # Invalid type
43
44 # Main program
45 previous_units = float(input("Enter Previous Units (PU): "))
46 current_units = float(input("Enter Current Units (CU): "))
47 customer_type = input("Enter Type of Customer (Domestic/Commercial/Industrial): ")
48
49 units_consumed = current_units - previous_units
50 ec = calculate_energy_charges(customer_type, units_consumed)
51 fc = calculate_fixed_charges(customer_type)
52
53 print(f"Units Consumed: {units_consumed}")
54 print(f"Energy Charges (EC): ${ec:.2f}")
55 print(f"Fixed Charges (FC): ${fc:.2f}")

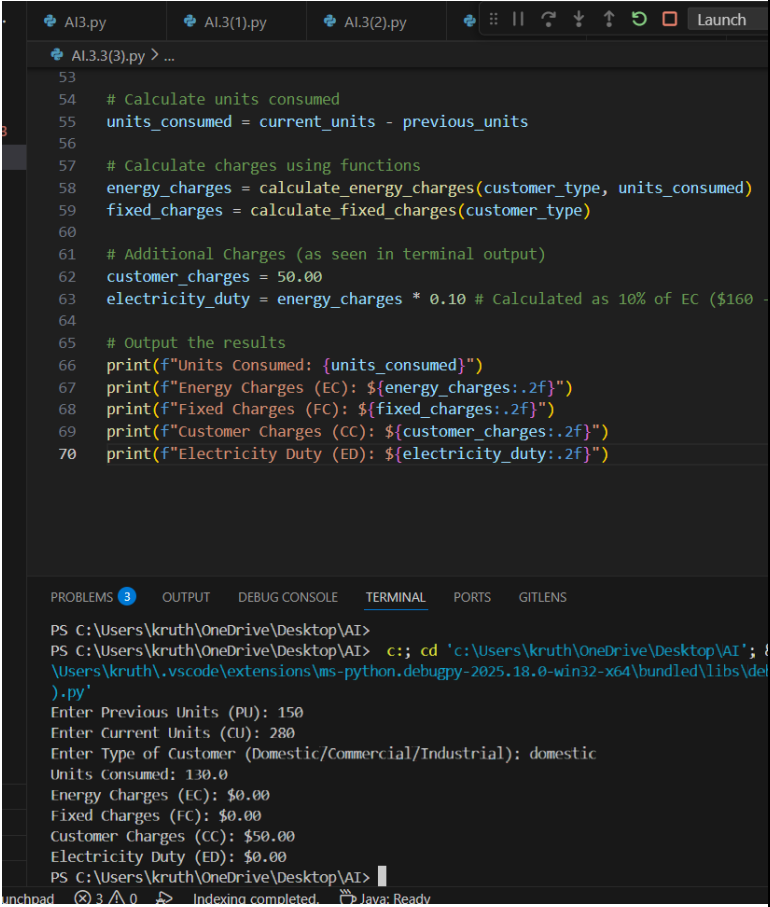
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```

PS C:\Users\shasho c; cd 'c:\Users\shash'; & 'c:\Users\shash\anaconda3\envs\Shashidhar\python.exe' 'c:\Users\shash\AAC A (3.3).py'
sh\AAC A (3.3).py'
Fixed Charges (FC): $100.00
PS C:\Users\shasho c; cd 'c:\Users\shash'; & 'c:\Users\shash\anaconda3\envs\Shashidhar\python.exe' 'c:\Users\shash\AAC A (3.3).py'
Enter Previous Units (PU): 0
Enter Current Units (CU): 250
Enter Type of Customer (Domestic/Commercial/Industrial): Commercial
Units Consumed: 250.0
Energy Charges (EC): $600.00
Fixed Charges (FC): $200.00
PS C:\Users\shasho

```

|  |   |  |
|--|---|--|
|  | <p><b>Task 4: Calculation of Additional Charges</b></p> <p><b>Scenario</b></p> <p>Electricity bills include multiple additional charges.</p> <p><b>Task Description</b></p> <p>Extend the program to calculate:</p> <ul style="list-style-type: none"><li>• <b>FC</b> – Fixed Charges</li><li>• <b>CC</b> – Customer Charges</li><li>• <b>ED</b> – Electricity Duty (percentage of EC)</li></ul> <p>Use AI prompts like:</p> <ul style="list-style-type: none"><li>• <i>“Add electricity duty calculation”</i></li><li>• <i>“Improve billing accuracy”</i></li></ul> <p><b>Expected Output</b></p> <ul style="list-style-type: none"><li>• Individual charge values printed</li><li>• Correct duty calculation</li><li>• Well-structured output</li><li>• Verified intermediate results</li></ul>  <pre>53 54 # Calculate units consumed 55 units_consumed = current_units - previous_units 56 57 # Calculate charges using functions 58 energy_charges = calculate_energy_charges(customer_type, units_consumed) 59 fixed_charges = calculate_fixed_charges(customer_type) 60 61 # Additional Charges (as seen in terminal output) 62 customer_charges = 50.00 63 electricity_duty = energy_charges * 0.10 # Calculated as 10% of EC (\$160 64 65 # Output the results 66 print(f"Units Consumed: {units_consumed}") 67 print(f"Energy Charges (EC): \${energy_charges:.2f}") 68 print(f"Fixed Charges (FC): \${fixed_charges:.2f}") 69 print(f"Customer Charges (CC): \${customer_charges:.2f}") 70 print(f"Electricity Duty (ED): \${electricity_duty:.2f}")</pre> <pre>PS C:\Users\kruth\OneDrive\Desktop\AI&gt; PS C:\Users\kruth\OneDrive\Desktop\AI&gt; c:: cd 'c:\Users\kruth\OneDrive\Desktop\AI'; &amp; \Users\kruth\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\de ).py' Enter Previous Units (PU): 150 Enter Current Units (CU): 280 Enter Type of Customer (Domestic/Commercial/Industrial): domestic Units Consumed: 130.0 Energy Charges (EC): \$0.00 Fixed Charges (FC): \$0.00 Customer Charges (CC): \$50.00 Electricity Duty (ED): \$0.00 PS C:\Users\kruth\OneDrive\Desktop\AI&gt;</pre> |  |
|  | <p><b>Task 5: Final Bill Generation and Output Analysis</b></p> <p><b>Scenario</b></p> <p>The final electricity bill must present all values clearly.</p> <p><b>Task Description</b></p> <p>Develop the final Python application to:</p> <ul style="list-style-type: none"><li>• Calculate total bill:</li><li>• Total Bill = EC + FC + CC + ED</li><li>• Display:<ul style="list-style-type: none"><li>○ Energy Charges (EC)</li><li>○ Fixed Charges (FC)</li></ul></li></ul>  |  |

- Customer Charges (CC)
- Electricity Duty (ED)
- Total Bill Amount
- Analyze the program based on:
  - Accuracy
  - Readability
  - Real-world applicability

#### Expected Output

- Complete electricity bill output
- Neatly formatted display
- Sample input/output
- Short analysis paragraph

The screenshot displays a Python script in a code editor and its execution in a terminal window. The script, named `AI3.3(4).py`, defines a function `calculate_energy_charges` that calculates electricity charges based on customer type and units consumed. The terminal shows the program's execution with user input and a formatted output of the electricity bill.

```

1  # Final Electricity Billing System with Complete Charges Calculation
2
3  def calculate_energy_charges(customer_type, units_consumed):
4      """
5      Calculate Energy Charges (EC) based on customer type and tiered unit s
6      """
7      if customer_type == "Domestic":
8          if units_consumed <= 100:
9              return units_consumed * 1.0
10         elif units_consumed <= 200:
11             return 100 * 1.0 + (units_consumed - 100) * 2.0
12         else:
13             return 100 * 1.0 + 100 * 2.0 + (units_consumed - 200) * 3.0
14
15     elif customer_type == "Commercial":
16         if units_consumed <= 100:
17             return units_consumed * 1.5
18         elif units_consumed <= 200:
19             return 100 * 1.5 + (units_consumed - 100) * 2.5
20         else:
21             return 100 * 1.5 + 100 * 2.5 + (units_consumed - 200) * 4.0
22
23     elif customer_type == "Industrial":

```

PROBLEMS 3 OUTPUT DEBUG CONSOLE TERMINAL PORTS GITLENS

```

Enter Previous Units (PU): 150
Enter Current Units (CU): 280
Enter Type of Customer (Domestic/Commercial/Industrial): domestic

=====
FINAL ELECTRICITY BILL
=====
Customer Type      : domestic
Units Consumed    : 130.0
-----
Energy Charges (EC): $    0.00
Fixed Charges (FC) : $    0.00
Customer Charges(CC): $   50.00

```

```
Al3.py  Al3(1).py  Al3(2).py  Al3(3).py  Al3(4).py > ...
3 def calculate_energy_charges(customer_type, units_consumed):
22
23     elif customer_type == "Industrial":
24         if units_consumed <= 100:
25             return units_consumed * 2.0
26         elif units_consumed <= 200:
27             return 100 * 2.0 + (units_consumed - 100) * 3.0
28         else:
29             return 100 * 2.0 + 100 * 3.0 + (units_consumed - 200) * 5.0
30
31     return 0
32
33 def calculate_fixed_charges(customer_type):
34     """Calculate Fixed Charges (FC) based on customer category."""
35     charges = {"Domestic": 100.0, "Commercial": 200.0, "Industrial": 300.0}
36     return charges.get(customer_type, 0.0)
37
38 # --- Input Section ---
39 prev_units = float(input("Enter Previous Units (PU): "))
40 curr_units = float(input("Enter Current Units (CU): "))
41 cust_type = input("Enter Type of Customer (Domestic/Commercial/Industrial): ")
42
43 # --- Calculation Section ---

PROBLEMS 3 OUTPUT DEBUG CONSOLE TERMINAL PORTS GITLENS

FINAL ELECTRICITY BILL
=====
Customer Type      : domestic
Units Consumed     : 130.0
-----
Energy Charges (EC): $    0.00
Fixed Charges (FC) : $    0.00
Customer Charges(CC): $   50.00
Electricity Duty(ED): $    0.00
-----
TOTAL BILL AMOUNT  : $   50.00
=====

PS C:\Users\kruth\OneDrive\Desktop\AI>
```

**Note: Report should be submitted as a word document for all tasks in a single document with prompts, comments & code explanation, and output and if required, screenshots.**

NAME:CH.Kruthankiran

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BATCH:26

|  |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
|--|---|---|---------------------------------|--------------------|---------------|------------------------------|-------------------|----------------|----------------|--------------|----------------------------------|-----------------------|--------------------|-----------------|-------------------|---------------|---------------|-------------------------|-----------------------|----------------|
| <b>SCHOOL OF COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE</b>                                      |   | <b>DEPARTMENT OF COMPUTER SCIENCE ENGINEERING</b>   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| <b>Program Name:</b> B. Tech   |   | <b>Assignment Type:</b> Lab   | <b>Academic Year:</b> 2025-2026 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| <b>Course Coordinator Name</b>   |   | Dr. Rishabh Mittal  |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| <b>Instructor(s) Name</b>  |   | <table border="1"> <tr><td>Mr. S Naresh Kumar</td></tr> <tr><td>Ms. B. Swathi</td></tr> <tr><td>Dr. Sasanko Shekhar Gantayat</td></tr> <tr><td>Mr. Md Sallauddin</td></tr> <tr><td>Dr. Mathivanan</td></tr> <tr><td>Mr. Y Srikanth</td></tr> <tr><td>Ms. N Shilpa</td></tr> <tr><td>Dr. Rishabh Mittal (Coordinator)</td></tr> <tr><td>Dr. R. Prashant Kumar</td></tr> <tr><td>Mr. Ankushavali MD</td></tr> <tr><td>Mr. B Viswanath</td></tr> <tr><td>Ms. Sujitha Reddy</td></tr> <tr><td>Ms. A. Anitha</td></tr> <tr><td>Ms. M.Madhuri</td></tr> <tr><td>Ms. Katherashala Swetha</td></tr> <tr><td>Ms. Velpula sumalatha</td></tr> <tr><td>Mr. Bingi Raju</td></tr> </table> |                                 | Mr. S Naresh Kumar | Ms. B. Swathi | Dr. Sasanko Shekhar Gantayat | Mr. Md Sallauddin | Dr. Mathivanan | Mr. Y Srikanth | Ms. N Shilpa | Dr. Rishabh Mittal (Coordinator) | Dr. R. Prashant Kumar | Mr. Ankushavali MD | Mr. B Viswanath | Ms. Sujitha Reddy | Ms. A. Anitha | Ms. M.Madhuri | Ms. Katherashala Swetha | Ms. Velpula sumalatha | Mr. Bingi Raju |
| Mr. S Naresh Kumar   |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Ms. B. Swathi  |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Dr. Sasanko Shekhar Gantayat   |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Mr. Md Sallauddin  |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Dr. Mathivanan   |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Mr. Y Srikanth   |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Ms. N Shilpa   |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Dr. Rishabh Mittal (Coordinator)   |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Dr. R. Prashant Kumar  |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Mr. Ankushavali MD   |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Mr. B Viswanath  |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Ms. Sujitha Reddy  |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Ms. A. Anitha  |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Ms. M.Madhuri  |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Ms. Katherashala Swetha  |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Ms. Velpula sumalatha  |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| Mr. Bingi Raju   |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| <b>CourseCode</b>  | 23CS002PC304  | <b>Course Title</b>   | AI Assisted Coding              |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| <b>Year/Sem</b>  | III/II  | <b>Regulation</b>   | R23                             |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| <b>Date and Day of Assignment</b>  | Week2   | <b>Time(s)</b>  | 23CSBTB01 To 23CSBTB52          |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| <b>Duration</b>  | 2 Hours   | <b>Applicable to Batches</b>  | All batches                     |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| <b>Assignment Number: 3.4</b> (Present assignment number)/ <b>24</b> (Total number of assignments) |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
|  |   |   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| <b>Q.No.</b>   | <b>Question</b>   | <b>Expected Time to complete</b>  |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |
| 1  | Lab 4: Advanced Prompt Engineering – Zero-shot, One-shot, and Few-shot Techniques | Week2   |                                 |                    |               |                              |                   |                |                |              |                                  |                       |                    |                 |                   |               |               |                         |                       |                |



|  |  |  |
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|  | <p><b>Task 1: Zero-shot Prompt – Fibonacci Series Generator</b></p> <p><b>Task Description #1</b></p> <ul style="list-style-type: none"><li>• Without giving an example, write a single comment prompt asking GitHub Copilot to generate a Python function to print the first N Fibonacci numbers.</li></ul> <p><b>Expected Output #1</b></p> <ul style="list-style-type: none"><li>• A complete Python function generated by Copilot without any example provided.</li><li>• Correct output for sample input N = 7 → 0 1 1 2 3 5 8</li><li>• Observation on how Copilot understood the instruction with zero context.</li></ul> |  |
|--|--|--|

```
AI3.py X Untitled-2
C: > Users > kruth > OneDrive > Desktop > AI3.py > ...
1 def print_fibonacci(n):
2     if n <= 0:
3         print("Please enter a positive integer.")
4         return
5
6     a, b = 0, 1
7     for i in range(n):
8         print(a, end=" ")
9         a, b = b, a + b
10
11 # Testing the function
12 print_fibonacci(7)]

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS GITLENS
PS C:\Users\kruth\OneDrive\Desktop\AI> & 'c:\Users\kruth\AppData\Local\Microsoft\WindowsApps\python3.11.
n32-x64\bundled\libs\debugpy\launcher' '56953' '--' 'Untitled-
c:\Users\kruth\AppData\Local\Microsoft\WindowsApps\python3.11.
PS C:\Users\kruth\OneDrive\Desktop\AI> ^C
PS C:\Users\kruth\OneDrive\Desktop\AI>
PS C:\Users\kruth\OneDrive\Desktop\AI> c:: cd 'c:\Users\kruth\OneDrive\Desktop\AI'
ode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\l
0 1 1 2 3 5 8
PS C:\Users\kruth\OneDrive\Desktop\AI>
```

## Task 2: One-shot Prompt – List Reversal Function

### Task Description #2

- Write a comment prompt to reverse a list and provide one example below the comment to guide Copilot.

### Expected Output #2

- Copilot-generated function to reverse a list using slicing or loop.
- Output: [3, 2, 1] for input [1, 2, 3]
- Observation on how adding a single example improved Copilot's accuracy.

The screenshot shows a VS Code editor with a file named `AI3(1).py` open. The code defines a function `reverse_list` that takes a list `data` and returns `data[::-1]`. It then tests the function with `input_list = [1, 2, 3]` and prints the result. The terminal window at the bottom shows the command prompt output, which includes the file path, the command to run the script, and the output `[3, 2, 1]`.

```

AI3(1).py > ...
1  def reverse_list(data):
2      return data[::-1]
3
4  # Testing the function
5  input_list = [1, 2, 3]
6  result = reverse_list(input_list)
7  print(result)

```

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```

n32-x64\bundled\libs\debugpy\launcher' '56953' '--' 'Untitled-1'
c:\Users\kruth\AppData\Local\Microsoft\WindowsApps\python3.11.exe
PS C:\Users\kruth\OneDrive\Desktop\AI> ^C
PS C:\Users\kruth\OneDrive\Desktop\AI>
PS C:\Users\kruth\OneDrive\Desktop\AI> c::; cd 'c:\Users\kruth\OneDrive\Desktop\AI'
ode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs
0 1 1 2 3 5 8
PS C:\Users\kruth\OneDrive\Desktop\AI> ^C
PS C:\Users\kruth\OneDrive\Desktop\AI>
PS C:\Users\kruth\OneDrive\Desktop\AI> c::; cd 'c:\Users\kruth\OneDrive\Desktop\AI'
ode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs
[3, 2, 1]
PS C:\Users\kruth\OneDrive\Desktop\AI>

```

### Task 3: Few-shot Prompt – String Pattern Matching

### Task Description #3

- Write a comment with 2–3 examples to help Copilot understand how to check if a string starts with a capital letter and ends with a period.

### Expected Output #3

- A function is\_valid() that checks the pattern.
- Output: True or False based on input.
- Students reflect on how multiple examples guide Copilot to generate more accurate code.



The screenshot shows a Visual Studio Code editor with three tabs: AI3.py, AI3(1).py, and AI3(2).py. The active tab is AI3(2).py, which contains the following Python code:

```
1 def is_valid(text):
2     if not text:
3         return False
4     return text[0].isupper() and text.endswith('.')
5
6 # Testing the function
7 print(is_valid("Python is great. "))
8 print(is_valid("python is great. "))
9 print(is_valid("Python is great"))
```

Below the code editor is a terminal window with the following output:

```
PS C:\Users\kruth\OneDrive\Desktop\AI> ^C
PS C:\Users\kruth\OneDrive\Desktop\AI>
PS C:\Users\kruth\OneDrive\Desktop\AI> c:: cd 'c:\Users\kruth\OneDrive\
ode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugp
[3, 2, 1]
PS C:\Users\kruth\OneDrive\Desktop\AI> ^C
PS C:\Users\kruth\OneDrive\Desktop\AI>
PS C:\Users\kruth\OneDrive\Desktop\AI> c:: cd 'c:\Users\kruth\OneDrive\
ode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugp
True
False
False
PS C:\Users\kruth\OneDrive\Desktop\AI>
```

|  |  |  |
|--|--|--|
|  | <p><b>Task 4: Zero-shot vs Few-shot – Email Validator</b></p> <p>Task Description #4</p> <ul style="list-style-type: none"><li>• First, prompt Copilot to write an email validation function using zero-shot (just the task in comment).</li><li>• Then, rewrite the prompt using few-shot examples.</li></ul> <p><b>Expected Output #4</b></p> <ul style="list-style-type: none"><li>• Compare both outputs:</li></ul> <p>Zero-shot may result in basic or generic validation.</p> <p>Few-shot gives detailed and specific logic (e.g., @ and domain checking).</p> <ul style="list-style-type: none"><li>• Submit both code versions and note how few-shot improves reliability.</li></ul> |  |
|--|--|--|

```
... AI3.py AI3(1).py AI3(2).py AI3(3).py
AI3(3).py > validate_email
1 import re
2
3 def validate_email(email):
4     # Basic regex for email validation
5     pattern = r"^\S+@\S+\.\S+$"
6     return bool(re.match(pattern, email))
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS GITLEN

```
[3, 2, 1]
PS C:\Users\kruth\OneDrive\Desktop\AI> ^C
PS C:\Users\kruth\OneDrive\Desktop\AI>
PS C:\Users\kruth\OneDrive\Desktop\AI> c::; cd 'c:\Users\kruth\OneDrive\Desktop\AI'
ode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundle
True
False
False
PS C:\Users\kruth\OneDrive\Desktop\AI> ^C
PS C:\Users\kruth\OneDrive\Desktop\AI>
PS C:\Users\kruth\OneDrive\Desktop\AI> c::; cd 'c:\Users\kruth\OneDrive\Desktop\AI'
ode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundle
PS C:\Users\kruth\OneDrive\Desktop\AI>
```

## Task 5: Prompt Tuning – Summing Digits of a Number

### Task Description #5

- Experiment with 2 different prompt styles to generate a function that returns the sum of digits of a number.

|  |   |  |
|--|---|--|
|  | <p>Style 1: Generic task prompt</p> <p>Style 2: Task + Input/Output example</p> <p><b>Expected Output #5</b></p> <ul style="list-style-type: none"><li>• Two versions of the sum_of_digits() function.</li><li>• Example Output: sum_of_digits(123) → 6</li><li>• Short analysis: which prompt produced cleaner or more optimized code and why?</li></ul> |  |
|--|---|--|

AI3.py AI.3(1).py AI.3(2).py AI.3

AI.3(4).py > ...

```
1 def sum_of_digits(n):  
2     return sum(int(digit) for digit in str(ab  
3  
4 # Test case  
5 print(sum_of_digits(123)) # Output: 6
```

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```
PS C:\Users\kruth\OneDrive\Desktop\AI>  
PS C:\Users\kruth\OneDrive\Desktop\AI> c;; cd 'c:\User  
ode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bu  
PS C:\Users\kruth\OneDrive\Desktop\AI> ^C  
PS C:\Users\kruth\OneDrive\Desktop\AI>  
PS C:\Users\kruth\OneDrive\Desktop\AI> c;; cd 'c:\User  
ode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bu  
PS C:\Users\kruth\OneDrive\Desktop\AI> ^C  
PS C:\Users\kruth\OneDrive\Desktop\AI>  
PS C:\Users\kruth\OneDrive\Desktop\AI> c;; cd 'c:\User  
ode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bu  
6  
PS C:\Users\kruth\OneDrive\Desktop\AI>
```

Note: Report should be submitted a word document for all tasks in



|  |   |  |
|--|---|--|
|  | <b>a single document with prompts, comments &amp; code explanation,<br/>and output and if required, screenshots</b> |  |
|--|---|--|