M.Sc. (Five Year Integrated) in Computer Science

(Artificial Intelligence & Data Science)

Semester 1

Python Programming Lab

LAB CYCLE 1

Instructions:

1. Do and write programs with proper naming conventions.
2. Practice all programs on your own. Copying the solution from others will be penalized.
3. Maintain Index/ content properly.
4. Brief descriptions including algorithm used and flowchart of the work you did for each exercise.
5. If you believe I have an error in a lab, please inform me of it. Explain why you think it is an error and, if you like, suggest a correction.
6. Perform unit testing with prepared test cases.
7. Save the programs in a separate folder on PC (in Lab), and push it in your Git repo.

SL No	Question	Concepts Covered
1.	Develop a program to read a four-digit number and find its a. Sum of digits b. Reverse c. Difference between the product of digits at the odd position and the product of digits at the even position. Example: **Input** 234 **Output** 10 (1+2+3+4) 4321 -5(1*3 - 2*4)	input () Strings Arithmetic operators
2.	Develop a program to read the three sides of two triangles and calculate the area of both. Define a function to read the three sides and call it. Also, define a function to calculate the area. Print the total area enclosed by both triangles and each triangle's contribution (%) towards it. $A = \sqrt{s(s-a)(s-b)(s-c)} \quad \text{with} \quad s = \frac{a+b+c}{2}$	Datatype Functions Expressions Built-in functions

<table>
<tr>
<td>3.</td>
<td>Develop a program to read the employee's name, code, and basic pay and calculate the gross salary, deduction, and net salary according to the following conditions. Define a function to find each of the components. Finally, generate a payslip.

<table>
<tr><th>Basic Pay (BP)</th><th>DA (%)</th><th>HRA (%)</th><th>MA</th><th>PT</th><th>PF (%)</th><th>IT (%)</th></tr>
<tr><td><10000</td><td>5</td><td>2.5</td><td>500</td><td>20</td><td>8</td><td>_</td></tr>
<tr><td><30000</td><td>7.5</td><td>5</td><td>2500</td><td>60</td><td>8</td><td>_</td></tr>
<tr><td><50000</td><td>11</td><td>7.5</td><td>5000</td><td>60</td><td>11</td><td>11</td></tr>
<tr><td>else</td><td>25</td><td>11</td><td>7000</td><td>80</td><td>12</td><td>20</td></tr>
</table>

Gross Salary (GS) : BP + DA + HRA + MA
Deduction (D): PT + PF + IT
Net Salary = GS – D</td>
<td>Conditional Branching</td>
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<td>4.</td>
<td>Develop a program to perform the following task:
a. Define a function to check whether a number is happy or not.
b. Define a function to print all happy numbers within a range.
c. Define a function to print first N happy numbers.

A happy number is a number defined by the following process:

• Starting with any positive integer, replace the number with the sum of the squares of its digits.
• Repeat the process until the number equals 1 (where it will stay), or it loops endlessly in a cycle which does not include 1.
• Those numbers for which this process ends in 1 are happy.

Note: if a number is not being happy after 100 iterations, consider it sad.</td>
<td>Loops – for, while

Nested loops</td>
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<td>5.</td>
<td>Develop a program to read a string and perform the following operations:
• Print all possible substrings.
• Print all possible substrings of length K.
• Print all possible substrings of length K with N distinct characters.
• Print substring(s) of length maximum length with N distinct characters.
• Print all palindrome substrings.

Define function for each of the task.</td>
<td>Strings, String functions, Slicing</td>
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