# 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 program files 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<br>a. Sum of digits<br>b. Reverse<br>c. Difference between the product of digits at the odd position and the product of digits at the even position.<br>Example:<br>**Input**<br>234<br>**Output**<br>10 (1+2+3+4)<br>4321<br>-2(1+3 - 2+4) | input ()<br>Strings<br>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.<br>$A = \sqrt{s(s-a)(s-b)(s-c)} \quad \text{with} \quad s = \frac{a+b+c}{2}$ | Datatype<br>Functions<br>Expressions<br>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.<br><br>
<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>
<br>Gross Salary (GS) : BP + DA + HRA + MA<br>Deduction (D): PT + PF + IT<br>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:<br>a. Define a function to check whether a number is happy or not.<br>b. Define a function to print all happy numbers within a range<br>c. Define a function to print first N happy numbers<br>A happy number is a number defined by the following process:<br><br>• Starting with any positive integer, replace the number with the sum of the squares of its digits.<br>• Repeat the process until the number equals 1 (where it will stay), or it loops endlessly in a cycle which does not include 1.<br>• Those numbers for which this process ends in 1 are happy.<br><br>Note: if a number is not being happy after 100 iterations, consider it sad.</td>
<td>Loops – for, while<br><br>Nested loops</td>
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<td>5.</td>
<td>Develop a program to read a string and perform the following operations:<br>• Print all possible substring<br>• Print all possible substrings of length K<br>• Print all possible substrings of length K with N distinct characters<br>• Print all palindrome substrings</td>
<td>Strings, String functions, Slicing</td>
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