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COURSE CODE: CSC202/208
DEPARTMENT: COMPUTER SCIENCE WITH MATHEMATICS

LAB 5 PRACTICAL

Question: Read a file containing angles and convert all to radians, saving results in a new file.

a What was the name of the Python IDE that was used?

Visual Studio Code

b The output of the program

The output of your program **(Radians.txt)** is a new text file that contains the radian values of the angles read from the original input file.

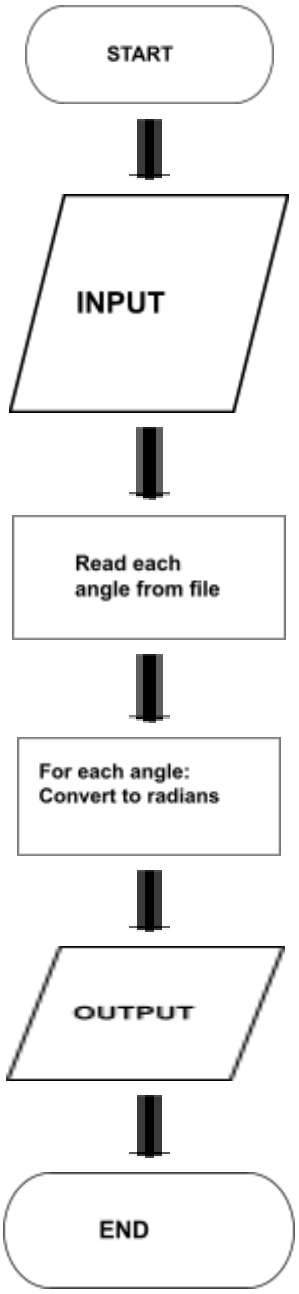
c Algorithm

1. Start the program.
   Import the `math` module to use the `radians()` function.
2. Open the input file (e.g., `"angles.txt"`) in read mode.
3. Create an empty list to store radian values.
4. Read all lines from the input file.
5. For each line in the file:

- Remove white spaces using `.strip()`.
- Check if the line is not empty.
- Convert the value from string to float (degree).
- Use `math.radians(degree)` to convert it to radians.

6. Store the radian value in the list.
7. Close the input file.
8. Open the output file (e.g., `"radians.txt"`) in write mode.
9. Write each radian value into the file, one per line.
10. Close the output file.
11. End the program.

d Flowchart



e Reflection

This task helped me practice file handling and mathematical operations in Python. What interested me most was how simple Python makes these tasks with built-in libraries like `math`. The most challenging part was making sure all inputs were valid numbers. I added error handling to prevent the program from crashing when encountering blank lines or wrong values. It took me about 60 minutes(1hr) to complete and test the program. I enjoyed running the code and seeing the correct radian outputs in the new file.

f Overall time to solve

60 MINUTES (1hr).

LAB 6 PRACTICAL

Question: Create a NumPy array to simulate thermal expansion over a temperature range.

a What was the name of the Python IDE that was used?

Visual Studio Code

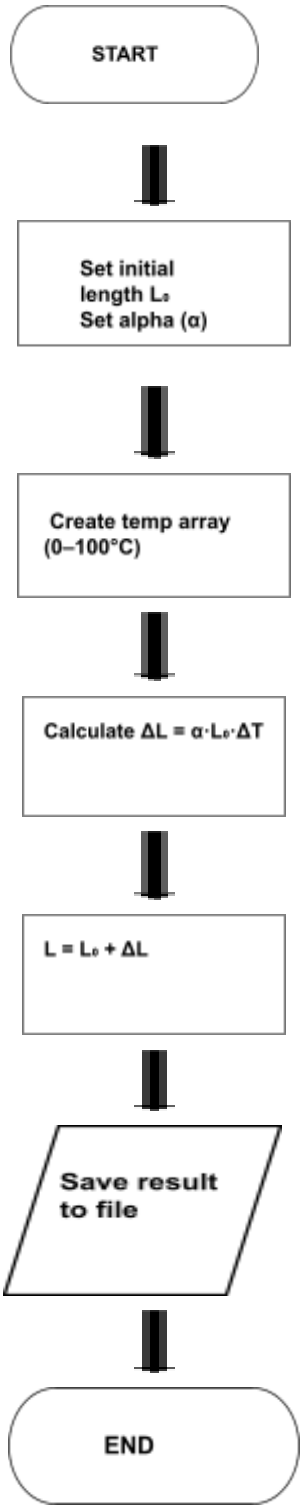
b The output of the program

This program creates a NumPy array representing temperature values from 0°C to 100°C in steps of 10(**thermal_expansion.txt**).It uses the thermal expansion formula to compute how a material's length changes as the temperature increases.

c Algorithm

1. Start the program.
2. Import the `numpy` module.
3. Define the **initial length** of the material (e.g., 1 meter).
4. Define the **coefficient of linear expansion**, `α`.
5. Create a **temperature array** using `np.arange()` from 0°C to 100°C.
6. Use the thermal expansion formula:
   ΔL=α×L0×ΔT\Delta L = alpha * L0 * Delta T * ΔL=α×L0×ΔT
7. Calculate the **final length** for each temperature using `L = L0 + ΔL`.
8. Print the results.
9. Write the results into a file (`thermal_expansion.txt`).
10. End the program.

d Flowchart



e Reflection

This lab involved simulating thermal expansion using **NumPy** in Python. I calculated changes in length over a temperature range using a scientific formula and saved the results

in a text file. It demonstrated practical application of arrays and mathematical operations in programming.It took me about 40 minutes to complete and test the program.

f Overall time to solve

40 MINUTES