Python Practical Evaluation Exam

Section A: Core Python & Logic (20 Marks)

1. Matrix Rotation (10 Marks)
Write a program to rotate a 2D matrix by 90 degrees without using external libraries.
Example:
Input:

```
[[1,2,3],
 [4,5,6],
 [7,8,9]]
```

Output:

```
[[7,4,1],
 [8,5,2],
 [9,6,3]]
```

2. Generator Function (10 Marks)
Write a generator function prime_generator(n) that yields all prime numbers up to n.
Use it to print primes up to 50.

Section B: Applied Problem Solving (40 Marks)

3. Decorator – Execution Time (10 Marks)
Write a decorator @timing that calculates how long a function takes to execute.
Test it with a function that sums numbers from 1 to 1,000,000.

4. Text File Word Analyzer (10 Marks)
Given a text file data.txt, write a program to:
- Count total words
- Find the 5 most frequent words
- Ignore case sensitivity

5. OOP + Inheritance (10 Marks)
Design classes for a Vehicle System:
- Base class: Vehicle (brand, model, price)
- Subclass: Car (seating_capacity)
- Subclass: Bike (engine_cc)

Create objects and print their details using __str__.

6. API + Data Processing (10 Marks)
Fetch weather data from API:

https://api.open-meteo.com/v1/forecast?
latitude=20&longitude=77&hourly=temperature_2m
- Print the highest temperature of the day
- Print the average temperature

Section C: Real-World Mini Projects (40 Marks)

7. Mini Project – Student Result System (40 Marks)

Build a Python program that manages student exam results.

Requirements:
- Store data in SQLite (students(id, name, subject, marks))
- Insert at least 10 records across multiple subjects
- Write functions to:
  - Add a new student record
  - Fetch all records of a student by id
  - Calculate total and average marks of a student
  - Display top 3 students overall based on average marks

Extra Credit:
- Export top 3 students' data to a top_students.json file