Chapter 8 - File Handling in Python

1️⃣ Introduction to File Handling

File handling allows Python programs to **store, read, and manage data** saved on the computer - such as notes, logs, student records, or CSV files.

Real-world uses:

- Saving login logs
- Writing reports
- Storing student data
- Reading configuration files
- Exporting analytics in CSV

2️⃣ Types of Files

File Type	Description	Example Extensions
Text Files	Human-readable content	`.txt`, `.csv`, `.log`
Binary Files	Data stored in encoded form	`.png`, `.jpg`, `.mp4`, `.pdf`, `.exe`

Examples:

- A file named **notes.txt** storing Saumya's Python concepts → *text file*
- A file named **profile.jpg** storing Saumya's photo → *binary file*

3️⃣ Opening Files

Python uses the `open()` function:

```
file = open("filename", "mode")
```

Common Modes

Mode	Meaning
`"r"`	Read (default)
`"w"`	Write (overwrites file)
`"a"`	Append (adds at end)
`"x"`	Create new file; error if exists
`"t"`	Text mode
`"b"`	Binary mode

Example:

```
f = open("notes.txt", "r")
print(f.read())
f.close()
```

Practice Questions – Opening Files

Easy:

1. Write code to open a file named `mydata.txt` in read mode.

2. Write a program to read a text from a given file certificate.txt and find whether it contains the word live.

3. What happens if you open a non-existing file in `"r"` mode?

4. Open a file called `report.txt` in write mode.

Medium:

4. Create a file named `saumya_info.txt` using `"x"` mode.
5. Write a program to safely check whether a file exists before opening it.

4️⃣ Reading Files

a) Read entire file

```
with open("notes.txt", "r") as f:
    data = f.read()
    print(data)
```

b) Read line by line

```
with open("notes.txt", "r") as f:
    line = f.readline()
    print(line)
```

c) Read all lines

```
with open("notes.txt", "r") as f:
    lines = f.readlines()
    print(lines)
```

Example File (notes.txt):

```
My name is Saumya Singh
I am learning Python File Handling
```

Practice Questions – Reading Files

1. Read a file named `story.txt` and print the full content.
2. Read only the first line of `bio.txt`.
3. Print how many lines are present in `notes.txt`.

5️⃣ Writing Files

Write (w mode):

Overwrites existing content.

```
with open("demo.txt", "w") as f:
    f.write("This is Saumya's first Python file.")
```

Running it again replaces everything.

Append (a mode):

Adds new content.

```
with open("demo.txt", "a") as f:
    f.write("\nMore content added by saumya1singh.")
```

Practice Questions – Writing Files

1. Write your name and class into a file named `intro.txt`.
2. Create a file `goals.txt` and write 3 goals for this month.
3. Append `"Completed"` to an existing file `status.txt`.

6️⃣ Using `with` Statement

This is the recommended method because it automatically closes the file.

```
with open("notes.txt", "r") as f:
    content = f.read()
```

Benefits:

- Safer
- Cleaner
- No need for `close()`

Practice Questions – Using `with`

Easy:

1. Use `with` to read the entire content of `info.txt`.
2. Use `with` to write `"Hello World"` in `hello.txt`.

7️⃣ Automating File Tasks (Copy, Rename, Delete)

Using Python modules:

Think of a module as a toolbox.

Each module gives you tools (functions) that you don't have to write again.

Copy file

```
import shutil
shutil.copy("demo.txt", "backup_demo.txt")
```

Rename file

```
import os
```

```
os.rename("demo.txt", "new_demo.txt")
```

Delete file

```
import os
os.remove("oldfile.txt")
```

Practice Questions – Automation

1. Copy `notes.txt` to `notes_backup.txt`.
2. Rename `temp.txt` to `final.txt`.
3. Ask user for a filename and copy it to a backup folder.

8️⃣ Real-Life Mini Example: Saumya's Daily Log App

Some office laptops have such scripts in the background when user logs in.

```
import datetime

with open("mylog.txt", "a") as f:
    f.write(f"Saumya logged in at {datetime.datetime.now()}\n")
```

Every time the program runs, a new log entry is added.

📘 Practice Set

1. Word Counter

Count how many words are present in the file `notes.txt`.

2. Log Appender

Append the current date and time to a file `logs.txt` whenever the program runs.

✅ Summary Table

Operation	**Method**
Open file	`open()`
Read file	`read()`, `readline()`, `readlines()`
Write file	`write()`
Append	mode `"a"`
Auto-close	`with open()`
Copy/Move	`shutil.copy()`
Rename/Delete	`os.rename()`, `os.remove()`