Lab Work – Conditionals

Objective

The objective of this lab is to learn and apply conditional statements (if, elif, else) in Python to solve real engineering problems. These tasks help students understand decision-making in programs, classify values, validate files, check safety conditions, and analyze electrical parameters.

Task 1 – Voltage Level Classification

Read voltage readings from a text file (one per line)

Classify each voltage as:

Low (< 110V)

Medium (110V–220V)

High (> 220V)

Save the classification results into a new file

In [1]:
```
with open("voltages.txt", "r") as infile:
    voltages = infile.readlines()
with open("classified_voltages.txt", "w") as outfile:
    for v in voltages:
        voltage = int(v.strip())
        if voltage < 110:
            result = "Low"
        elif voltage <= 220:
            result = "Medium"
        else:
            result = "High"

        outfile.write(f"{voltage}V -> {result}\n")

print("Classification completed! Check classified_voltages.txt")
```

```
Classification completed! Check classified_voltages.txt
```

Task 2 – Pass/Fail Test Report

Read student lab test scores from a file

Conditions:

≥ 50 -> Pass

< 50 -> Fail

In [2]:
```
with open("score.txt", "r") as infile:
    scores = infile.readlines()
with open("results.txt", "w") as outfile:
    for s in scores:
        score = int(s.strip())
        if score >= 50:
            result = "Pass"
        else:
            result = "Fail"
        outfile.write(f"{score} → {result}\n")
print("Pass/Fail report generated! Check results.txt")
```

```
Pass/Fail report generated! Check results.txt
```

Task 3 – Current Rating Check (Electrical Machines)

Read current values from file

Classify each reading:

< 5A -> Safe

5A to < 10A -> Warning

≥ 10A -> Overload

In [3]:
```
with open("currents.txt", "r") as infile:
    currents = infile.readlines()
with open("current_results.txt", "w") as outfile:
    for c in currents:
        current = float(c.strip())
        if current < 5:
            result = "Safe"
        elif current < 10:
            result = "Warning"
        else:
            result = "Overload"
        outfile.write(f"{current}A → {result}\n")
print("Current rating check completed! Check current_results.txt")
```

```
Current rating check completed! Check current_results.txt
```

Task 4 – File Extension Validator

Scan all files in a directory

Classify each file:

Ends with .pdf -> Valid Report

Ends with .docx -> Needs Conversion

Otherwise -> Invalid Format

Count and display totals of each category

In [4]:
```python
import os
files = os.listdir(r'C:\Users\ZUHA\OneDrive\Документи\2nd Semester\reportsCpp\
pdf_count = 0
docx_count = 0
invalid_count = 0
for file in files:
    if file.endswith(".pdf"):
        print(f"{file} -> Valid Report")
        pdf_count += 1
    elif file.endswith(".docx"):
        print(f"{file} -> Needs Conversion")
        docx_count += 1
    else:
        print(f"{file} -> Invalid Format")
        invalid_count += 1
print("\nSummary:")
print(f"Valid Reports (.pdf): {pdf_count}")
print(f"Needs Conversion (.docx): {docx_count}")
print(f"Invalid Formats: {invalid_count}")
```

```
Lab 01_cpp.pdf -> Valid Report
Lab 02 _cpp.pdf -> Valid Report
Lab 03_cpp.pdf -> Valid Report
Lab 06_cpp.pdf -> Valid Report
Lab 09_cpp.pdf -> Valid Report
Lab 10_cpp.pdf -> Valid Report
Lab 11_cpp.pdf -> Valid Report
Lab 12 _cpp.pdf -> Valid Report
Lab 13_cpp.pdf -> Valid Report
LAB 14_cpp.pdf -> Valid Report
Lab04_cpp.pdf -> Valid Report
lab05_cpp.pdf -> Valid Report
Lab07_cpp.pdf -> Valid Report
lab08_cpp.pdf -> Valid Report
OEL_cpp.pdf -> Valid Report

Summary:
Valid Reports (.pdf): 15
Needs Conversion (.docx): 0
Invalid Formats: 0
```

Task 5 – Resistor Value Validator

Input a resistor value (e.g., 220, 330, 470, 1000)

Check if value is in standard list → Standard Resistor

Otherwise → Non-standard Resistor

In [5]:
```
value = 330
standard_values = [220, 330, 470, 1000]
if value in standard_values:
    print("Standard Resistor")
else:
    print("Non-standard Resistor")
```

```
Standard Resistor
```

If we change the value

In [6]:
```
value = 1103
standard_values = [220, 330, 470, 1000]

if value in standard_values:
    print("Standard Resistor")
else:
    print("Non-standard Resistor")
```

```
Non-standard Resistor
```

Task 6 – Voltage Divider Check

Input supply voltage (Vin) and measured voltage (Vout)

Conditions:

If Vout < Vin/2 → Lower Half of Divider

Else → Upper Half of Divider

In [7]:
```
V_in = int(input("Enter supply voltage (V_in): "))
V_out = int(input("Enter measured voltage (V_out): "))
if V_out < V_in / 2:
    print("Lower Half of Divider")
else:
    print("Upper Half of Divider")
```

```
Upper Half of Divider
```

Task 7 – High Voltage Safety Check

Input a voltage

If > 220V → High Voltage

Else → Normal Voltage

In [8]:
```
voltage = int(input("Enter voltage value: "))
if voltage > 220:
    print("High Voltage")
else:
    print("Normal Voltage")
```

```
High Voltage
```

Task 8 – Short Circuit Detection

Input resistance value

If resistance == 0 → Short Circuit

Else → Safe

In [9]:
```
resistance = int(input("Enter resistance value: "))
if resistance == 0:
    print("Short Circuit")
else:
    print("Safe")
```

```
Safe
```

Task 9 – Temperature Safety Check

Input temperature

If > 40°C → Overheated

Else -> Safe Temperature

In [10]:
```
temp = int(input("Enter temperature in °C: "))
if temp > 40:
    print("Overheated")
else:
    print("Safe Temperature")
```

```
Overheated
```

Task 10 – Battery Charging Status

Input battery percentage

If 100 → Fully Charged

Elif 50 → Half Charged

Else → Charging....

In [11]:
```
battery = int(input("Enter battery percentage: "))
if battery == 100:
    print("Fully Charged")
elif battery == 50:
    print("Half Charged")
else:
    print("Charging...")
```

```
Charging...
```

Task 11 – Frequency Range Checker

Input frequency

If < 40 → Too Low

40–60 → Normal Range

60 → Too High

In [12]:
```
freq = float(input("Enter frequency in Hz: "))
if freq < 40:
    print("Too Low")
elif 40 <= freq <= 60:
    print("Normal Range")
else:
    print("Too High")
```

```
Too High
```

Task 12 – Student Grade Classification

Input marks

If ≥ 90 -> A

Else if ≥ 80 -> B

Else if ≥ 70 -> C

Else if ≥ 60 -> D

Else -> Fail

In [13]:
```
marks = int(input("Enter student marks: "))
if marks >= 90:
    print("A")
elif marks >= 80:
    print("B")
elif marks >= 70:
    print("C")
elif marks >= 60:
    print("D")
else:
    print("Fail")
```

```
D
```

Task 13 – Light Intensity Classification (Smart Buildings)

Input lux value

Classify as:

< 50 -> Pitch Dark – Lights ON full

< 100 -> Very Dim – Lights ON medium

< 300 -> Dim Light – Lights ON low

< 600 -> Normal Brightness – Lights Balanced

< 1000 -> Bright – Lights OFF

Else -> Too Bright – Close Curtains

In [14]:
```
lux = int(input("Enter lux value: "))

if lux < 50:
    print("Pitch Dark - Lights ON full")
elif lux < 100:
    print("Very Dim - Lights ON medium")
elif lux < 300:
    print("Dim Light - Lights ON low")
elif lux < 600:
    print("Normal Brightness - Lights Balanced")
elif lux < 1000:
    print("Bright - Lights OFF")
else:
    print("Too Bright - Close Curtains")
```

```
Very Dim - Lights ON medium
```