CL1002
Programming Fundamentals

Lab 05
Tasks

NATIONAL UNIVERSITY OF COMPUTER AND EMERGING SCIENCES

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Amna Mubarak

LAB EXERCISES

Task 1 – Weather Safety Alert System

A smart city weather monitoring system issues alerts based on multiple conditions. First, it checks if the temperature is below 0°C, between 0–35°C, or above 35°C. If the temperature is below 0°C, the system further checks if snowfall is detected; if yes, it issues a Snowstorm Alert, otherwise a Frost Warning. If the temperature is above 35°C, the system checks the humidity: if humidity is high, it issues a Heatwave with High Humidity Alert, otherwise a Dry Heatwave Alert. For all other temperatures, the system issues a Normal Weather message. Write a program that uses nested if-else to implement this logic.

Task 2 – Smart University Access Control

A university has installed smart gates that decide access permissions. The system first checks if a person is a student, faculty, or visitor. If the person is a student, it checks whether they are undergraduate or postgraduate. Undergraduate students are only allowed between 8 AM to 6 PM, while postgraduates have 24-hour access. If the person is faculty, the system checks if they are full-time or visiting; full-time faculty always have access, but visiting faculty only during official hours. Visitors must have a valid appointment to enter. Write a program that uses nested if-else to implement this gate system.

Task 3 – Multi-Layer Sports Tournament Eligibility

A sports board is selecting players for an international tournament. First, it checks if the player is fit for play (medical clearance). If not, they are rejected. If medically cleared, the system checks whether the player's age is between 18 and 35. If yes, it further checks whether their performance score is above 80%. If all conditions are satisfied, the player is selected; otherwise, they are marked as Not Eligible. Write a program to implement this scenario using nested if-else.

Task 4 – Smart Library Digital Access

A digital library allows access to e-resources with layered permissions. First, the system checks whether the user is logged in. If not, access is denied. If logged in, it checks the membership type: free, standard, or premium. Free users only get access to open e-books, standard members get e-books and journals, and premium members get all resources including research papers and datasets. Additionally, if a premium member is a PhD student, they are also allowed to access archived historical collections. Write a program using nested if-else to simulate this system.

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Task 5 – University Exam Grade Decision

A university grading system needs to display results differently for Midterm and Final exams. The first switch checks the exam type. Inside Midterm, another switch checks the grade (A, B, C, D, F) and assigns remarks like “Good Progress,” “Needs More Practice,” etc. Inside Final, the same grades give different remarks like “Excellent Overall Performance” or “Retake Required.” Write a program using a nested switch–case to handle this grading system.

Task 6 – Smart Traffic Fine System

A traffic police system checks rule violations based on vehicle type (Car, Motorcycle, Truck). Inside each vehicle type, another switch checks the violation type: overspeeding, signal breaking, or wrong parking. For example, overspeeding on a car costs Rs. 3000, while overspeeding on a truck costs Rs. 8000. Write a program using nested switch–case to calculate and display the correct fine.

Task 7 – Online Movie Streaming Controls

A streaming platform provides access to movies based on age and subscription type. First, the program checks if the user is under 18 or adult. If under 18, it further checks whether the movie rating is General (G) or Parental Guidance (PG-13) — only these are allowed. Adults can watch all ratings, but the program then checks subscription: Basic users get Standard Definition (SD) only, while Premium users get High Definition (HD). Write a program using nested if-else to enforce these rules.

Task 8 – Banking Loan Interest Calculator

A bank calculates interest rates using multiple conditions. If the loan type is Home Loan, customers with salary above Rs. 100,000 get 8% interest, otherwise 10%. If the loan type is Car Loan, customers with credit score above 700 get 9%, otherwise 12%. For all other loans, a flat 15% applies. Write a program using nested ternary operators to implement this logic.

Task 9 – Scientific Calculator

A scientific calculator program allows users to perform different operations. If the user chooses Basic Mode, they can calculate square roots, powers, or logarithms. Inside Advanced Mode, the system further allows calculations like trigonometric functions (sine, cosine, tangent). Write a program using nested if-else with math library functions to build this calculator.

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Task 10 – Multi-Level Cybersecurity Check

A company implements strict login security. First, the program checks if the username exists. If not, access is denied. If valid, the system checks whether the password is correct. If correct, it further checks if the account has two-factor authentication enabled. If yes, the program verifies the OTP. If OTP is correct, access is granted; otherwise, denied. If no two-factor authentication is enabled, access is granted directly. Write a program using nested if-else to implement this system.

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