CL1002 Programming Fundamentals (Lab CS B, C, & E)

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Course Instructors

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Serial No:

Final Term Exam

Total Time: 3 Hour

Total Marks: 100

_____

Signature of Invigilator

_____	_____	_____
Roll No	Section	Signature

DO NOT OPEN THE QUESTION BOOK OR START UNTIL INSTRUCTED.

Instructions:

1. Verify at the start of the exam that you have a total of five (5) questions printed on six (6) pages including this title page.
2. The exam is closed books, closed notes. Please see that the area in your threshold is free of any material classified as 'useful in the paper' or else there may a charge of cheating.
3. Read the questions carefully for clarity of context and understanding of meaning and make assumptions wherever required, for neither the invigilator will address your queries, nor the teacher/examiner will come to the examination hall for any assistance.
4. Use only your own stationery and calculator. If you do not have your own calculator, use manual calculations.
5. Paper submissions will be in soft form; however, you are required to return your question paper to the invigilator.

	Q-1	Q-2	Q-3	Q-4	Q-5	Total
Total Marks	15	25	25	25	10	**100**
Marks Obtained						

Vetted By: _____Vetter Signature: _____

University Answer Sheet Required: No [X] Yes [ ]

Submission Instructions:

You are required to create a zip file of your submission using the following steps:

1. Create a folder named "Section_RollNum_PfLabFinal"
2. Inside the folder paste the .cpp files of your C++ source codes for each question with the naming convention "Section_RollNum_Q#", e.g. "BCS-1A_22F1234_Q1"
3. Also compile and paste a MS Word file containing your source codes and output screenshots with the naming convention "Section_RollNum_Final_Word" e.g., "BCS-1A_22F1234_Final_Word"
4. Zip the folder and name it "Section_RollNum_PfLabFinal"

Once you are done with the exam, inform the invigilator that you are done and then submit it according to the instructions given by them.

Q1	15 Marks

An online travel agency offering discount on different tickets for the passengers on **Economy Class only**, you need to write a C++ program to calculate Ticket Discount Calculation as a computer programmer. First you need to ask user to input the Ticket type as **"Economy Class"** OR **"Business Class".**
Hint: You can take input in character as 'E' for Economy Class and 'B' for Business Class to check.
You need to calculate Discount on Only **Economy class** ticket by **taking the original price** from user, calculate the discount as per the following criteria:

Criteria	Discount
Original Price < 500	**Discount 5%**
Original Price >= 500 and Original Price < 1000	**Discount 7%**
Original Price >= 1000 and Original Price < 2000	**Discount 10%**
Original Price >= 2000 and Original Price < 3000	**Discount 12%**
Original Price >= 3000 and Original Price < 4000	**Discount 15%**
Original Price >= 4000	**Discount 20%**

Note: If user enter the ticket type as **'B' Business Class** then no discount will be applying but Wi-Fi, and Extra Meal Service will be free. You just need to print the original price as it is along with message that you got **"Free Wifi and Extra Meal Service."**

For the economy class **Wi-Fi (50 PKR)** and **Extra Meal (150 PKR)** service is paid, **but it is optional** you need to ask from passenger whether he/she need it. If someone agree to either one of the service OR both. You need to also add respective amount for these service(s) in price after discount.

Expected Input: (In Case of Economy Class)
Enter Your Ticket Type: B= Business Class E=Economy Class: **E**
Enter Your Ticket Original Price: **750**
Do you need Wi-Fi will cost extra (50 PKR) Choose (Y for Yes N for No): **Y**
Do you need Extra Meal (150 PKR) Choose (Y for Yes N for No): **N**
Expected Output:
Ticket Type: **Economy Class**
Original Price: **PKR 750**
Discount Got: **7%**
Discounted Price: **PKR 697.50**
Service Charges (For Wi-Fi and Extra Meal): **PKR 50**
Ticket Price Need to Pay: **PKR 747.5**

Marks 6 = For Correct Implementation of Conditional Criteria

Marks 4 = For Correct Supporting Data Calculation, In Ticket Discount {Business Class, Extra Meal, Wi-Fi}

Marks 2 = Required Exception Handling

Marks 3 = For {Execution Error Free, Code Indentation, Proper Naming Convention, Appropriate Input / Output String Messages for User, Right Use of Constructs, Comments etc}

Q2	25 Marks

Write a computer program that takes a value 'n' as input from the user and then prints all the perfect numbers which are smaller than '2^n'.

Perfect Number: A Perfect Number N is defined as any positive integer where the sum of its divisors excluding the number itself (all numbers are divisors of themselves as well, e.g., 6 is divisible by 6) equals the number. The first few perfect numbers are:

6, 28, 496, and 8128.

Sample Input: 5
Sample Output: 6, 28
Explanation: 6 is a perfect number having factors 3,2,1
28 is a perfect number having factors 14, 7, 4, 2, 1
6 and 28 are smaller than $2^5 = 32$.

Test your code in the main function by giving an input.

Rubrics:
- **10 marks:** Looped logic for checking if a number is a perfect number or not.
- **05 marks:** Finding the range i.e., 0-2^n.
- **05 marks:** Loop for printing all perfect numbers in above range
- **05 marks:** Code optimization and output

Q3	25 Marks

1. Write a C++ program that inputs a character array of size 5*5. Each row contains some names and you have to input a sample name and find that sample name in each row and display the row(s) at which the name is found.

Input 2D Array Sample:

A	D	N	A	N
U	S	M	A	N
A	I	S	H	A
S	O	F	I	A
A	I	S	H	A

Input Sample Name: AISHA

Output Sample:
Name found at row 3
Name found at row 5

Correct input: 5 marks
Correct logic: 12 marks
Correct Boundary check: 3 marks
Correct output: 5 marks

Q4	25 Marks

An online trading company named **Forex Traders** wants to analyze its sales for the year 2022. Their requirements are listed below:

1. Store the 12 sales month-wise in an array by taking values from user.
2. Handle invalid entries.
3. **Scan** the array and search for sales ranging **between 100 and 150 (inclusive)**. **Replace** these values with the average sale per month for the year.
   For Example: Before replacing-> 200 150 90 106 12 90 45 189 96 55 34 123
   After replacing -> 200 **126** 90 **126** 12 90 45 189 96 55 34 **126**
4. Find the **maximum** and **second-lowest** sales.
   For Example: Sales are-> 10 150 90 106 12 90 45 189 96 55 34 10

   Maximum sales -> 189

Second-lowest sales-> 12 Print it on the screen.
5. Print list of sales on the screen after the above steps.
6. Determine the **sum** of total updated sales and then print it on the screen.

As a C++ developer, your task is to implement user-defined functions against each requirement.

Note: Your program should include the following functions: 3

a. **StoreSales(**array**);** //store positive integers 3
b. **PrintSales(**array**);** 2
c. **Sum(**array**);** // return the value of sum 3
d. **ScanAndReplace(**array**);** // display updated sales in the main function 5
e. **MaxAndMin(**array**);** //would print max and 2nd lowest 5
f. **Output;** 4

You can add other function parameters as per requirement.

Q5	10 Marks

There is a system that records the flight information in a file "infoflight.txt" that contains the flight code, Departure-city, Arrival-city, Departure time, and Arrival time. Flight officers have access to maintain flight information. Now, due to weather forecasts, the departure time of flights change at times.

Write a program that changes the departure time of a specific flight code entered by an officer, uses an array to read data from "infoflight.txt" and maintains the new record in a new file name as "flightUpdated.txt".

Assume that there will only be 30 flights' data in the file.

Note: You may choose to keep the format of the input and output files as desired, but the data stored will be as given in the question input/output sample.

For reference both files' snapshots are attached below:

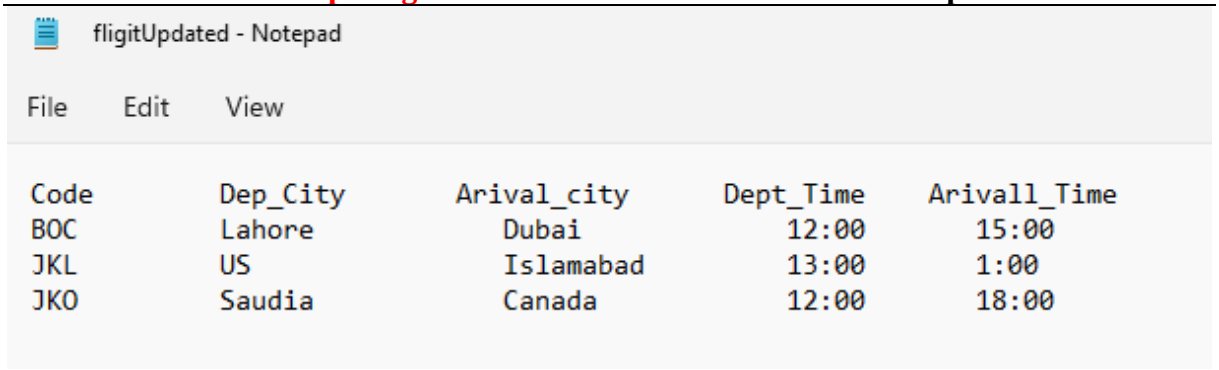
infoflight.txt

infoflight.txt

```
1   BOC  Lahore  Dubai      12:00  15:00
2   JKL  US      Islamabad  12:00  1:00
3   JKO  Saudia  Canada     12:00  18:00
```

After change timing of flight "JKL".

fligitUpdated.txt



Rubrics:

File Open/Close properly (1 Correct)
Exception Handling File open or not (2 Correct)
Read File+ Array (2.5 Correct) (1 without Array)
Write File+ Array (2.5 Correct) (1 without Array)
Main Condition with Delete /Update /Arithmetic (2 Correct)

Write down one best memory of your PF Lab course.