Ghulam Ishaq Khan Institute (GIKI)

Assignment # 2

Subject: Introduction to Computing & AI

Course Code: CS-101-A-Fall-24

Class: BS AI – 1st, **Batch:** 34 - Fall - 24

Submission Deadline: 26/Oct/2024-Sun (11:59-PM)

Instructor: M. Qasim Riaz, **TA:** Miss Amna Arooj

Total Marks: 105 (Marks are divided question wise)

Mastering C++ Fundamentals: A Practical Approach

The assignment aims to improve your C++ skills by practicing important concepts like **while** loops, **for** loops, **array** and the **switch** statement. Through practical exercises, you'll strengthen your understanding of these basics, enhance problem-solving, and gain hands-on experience. This assignment helps solidify your C++ knowledge for future challenges.

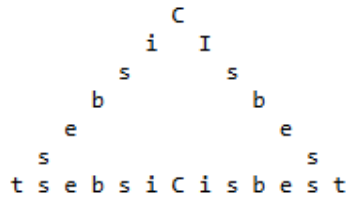
Submission Instructions:

- Create a different file for each question of the assignment.
- The name of each file should contain your roll number, assignment number & question number in a specific format.
- For Example, if your roll number is 2022532 you are doing 2nd assignment and question no 5 then file name of your C++ file should be written as ---> 2022532_2_5.cpp (similarly, create for each question).
- Submission: zip all files and upload to teams. Also upload the pdf document containing the output screenshots of your tasks. Be prepared for viva or anything else after the submission of assignment.

Task 1: Write the Program that prints the number in reverse order. For example, your program asks the user for input i.e., 7654, and then the program should output 4567. Use Proper logic instead of "cout". (CLO2, PLO1) **(10 marks)**

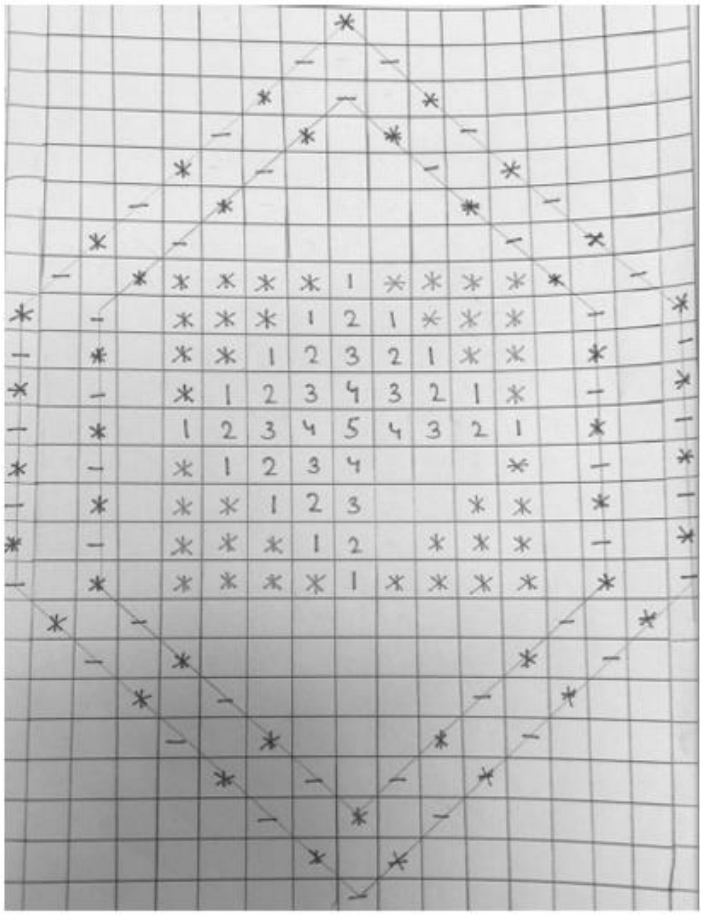
Task 2: Write a C++ program to produce the following patterns using nested/loops: (CLO2, PLO1) **(35 marks)**

1.

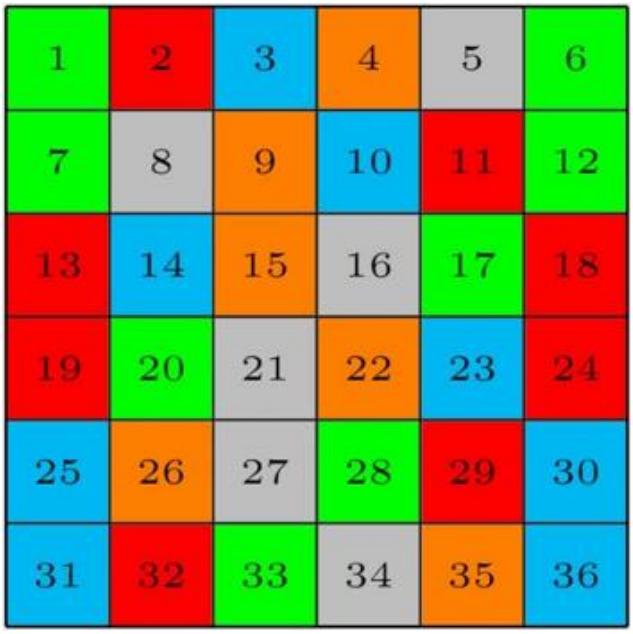


2. The base of the staircase contains 32 asterisks and height contains 16 asterisks. Each step is 6 asterisks wide and 4 asterisks high.

3. The symbol in design pattern consists of numbers and symbol as shown in the figure.



Task 3: You are given a grid, as shown in the figure below, where each square has a specific color and number. Write a C++ program that accepts two numbers within the grid's range. The program should determine whether the two squares corresponding to the entered numbers have the same color. (CLO2, PLO1) **(10 marks)**



Task 4: Gray codes are binary numeral systems in which neighboring numbers differ by only one bit. They are used in digital systems and communication to prevent errors and glitches during transitions between values, enhancing data reliability and minimizing the risk of misinterpretation in various applications. Write a program that takes any non-zero 16-bit integer from the user and outputs its gray code value in bits. (CLO2, PLO1) **(10 marks)**

Decimal	Binary Inputs				Gray Outputs			
	B3	B2	B1	B0	G3	G2	G1	G0
0	0	0	0	0	0	0	0	0
1	0	0	0	1	0	0	0	1
2	0	0	1	0	0	0	1	1
3	0	0	1	1	0	0	1	0
4	0	1	0	0	0	1	1	0
5	0	1	0	1	0	1	1	1
6	0	1	1	0	0	1	0	1
7	0	1	1	1	0	1	0	0
8	1	0	0	0	1	1	0	0
9	1	0	0	1	1	1	0	1
10	1	0	1	0	1	1	1	1
11	1	0	1	1	1	1	1	0
12	1	1	0	0	1	0	1	0
13	1	1	0	1	1	0	1	1
14	1	1	1	0	1	0	0	1
15	1	1	1	1	1	0	0	0

Task 5: Write a program to manage 100 bank accounts. The accounts have numbers ranging from 1001 to 1100 (decimal). There are several types of transactions, which the program will read. If allowed, the program may modify the account balance. Otherwise, a warning message will be printed. The dialogue for the transactions have the following forms. (CLO2, PLO1) **(20 marks)**

In the following, the bold type represents questions the program types to the user. Each response to the transaction type question is a single character. Any attempted illegal transaction causes an error message. Amounts are in dollars and can have 0, 1 or 2 digits after the point: 2765 or 123.4 or 8864.57:

Interaction	Explanation
Transaction type?: O **Initial deposit?:** amount	Open an account, giving the initial deposit. Allowed if less than 100 accounts now open. Prints the new account number.
Transaction type?: B **Account number?:** account_number	A Balance inquiry, prints the account number and the balance, only allowed if the account is open.
Transaction type?: D **Account number?:** account_number **Amount?:** amount	A Deposit, prints the account number and new balance, only allowed if account open.
Transaction type?: W **Account number?:** account_number **Amount?:** amount	A Withdrawal, only allowed if account open and sufficient funds available, prints account number and new balance.
Transaction type?: C **Account number?:** account_number	Close the account. Only allowed if account is open.
Transaction type?: I **Interest rate?:** interest_rate	Compute interest at given % rate. and apply to all accounts
Transaction type?: P	Print all the account numbers and amounts.
Transaction type?: E	Close all accounts and exit program

Task 6: Add pin numbers to the bank accounts and add a special pin number for the bank manager. Add a transaction type S to open the bank. Only the manager should be allowed to do transactions S, P, I, and E. For each transaction, the computer must ask for the pin number. In an Open transaction, the user chooses the pin number for the account. (CLO2, PLO1) **(10 marks)**

Task 7: You have started working at a water plant and have been asked to develop a program that can calculate the total water consumption bill. Your program will input the number of gallons from the user and will continue to take input until the user decides to stop. The program will calculate the total bill according to the following conditions: (CLO2, PLO1) **(10 marks)**

1. The first 100 gallons at Rs.50/gallon
2. The next 250 gallons at Rs.100/gallon
3. The next 250 gallons at Rs.150/gallon
4. For additional gallons above 600, Rs. 250/gallon

An additional service charge of 14% is also added to the bill.
The program output should be displayed correct to 2 decimal places.