Lab 1: Algorithm tracing and simple C++ program design (I/O)

9:00 am to 12:00 pm

General instructions

- **No compensation or makeup lab**
- **Don't discuss with peers.**
- **Cheating cases will be given ZERO.**
- **You can ask only relevant queries from TAs between 9 am – 12pm.**
- **Submission must be done before ending time i.e. 12 pm. Even a few seconds late submission will be discarded**

No submission required for this lab; however, usual labs will have following submission protocol

- Submit your file in a .zip or .rar format using the submission link that will be shared by TAs. Name your file with your Roll number (e.g. BCSF20M001.zip or BCSF20M001.rar)
- Make a separate folder for each lab task (e.g. task1, task2…). The.cpp files must be in respective folder with a screenshot of the output of a program of the respective task.
- The algorithm design task must be submitted in format (.docx or PDF or jpeg or PNG). This file must be added to your zipped submission as instructed in previous steps
- Every Cpp file must contain your name and roll number(In comments) at the top of each program
- Don't enclose your code in comments otherwise it will not be evaluated.

Part 1: Algorithm Design

Design an algorithm for the following problem. You need to trace the output of your designed algorithm too (using tracetable).

1. Print the square of all numbers from LOW to HIGH. Dry run with LOW=1 and HIGH=10.

Note: there is no strict format of writing algorithms, just try to convey your logic using meaningful statements in English. Following sample will hopefully help.

Pls refer to the following sample algorithm and tracetable for the problem of computing $base^{power}$

Step #	Base	Power	Counter	Product	Counter<Power
1	2	?	?	?	?
2	2	4	?	?	?
3	2	4	0	1	?
4	2	4	0	2	?
5	2	4	1	2	?
6	2	4	1	2	1<4,T
4	2	4	1	4	?
5	2	4	2	4	?
6	2	4	2	4	2<4,T
4	2	4	2	8	?
5	2	4	3	8	?
6	2	4	3	8	3<4,T
4	2	4	3	16	?
5	2	4	4	16	?
6	2	4	3	16	4<4, F
7	2	4	3	16	?
Print 16					

- **Algorithm:**
- Step 1: **Base** = 2
- Step 2: **Power** = 4
- Step 3: **counter** = 0, **Product=1**
- Step 4: **Product** = **Product** * **Base**
- Step 5: **counter** = **counter** + 1
- Step 6: if **counter** IS LESS THAN **Power**
  - Goto Step 4
  - Else
    - Goto Step 7
- Step 7: Print Product

Part 2: C++ program design

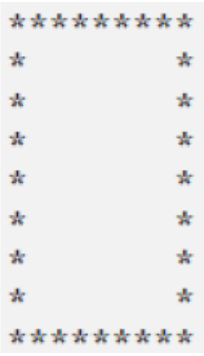
Write a c++ program that performs the following task(s) using stream extraction operator "cout". You need to create a new project and write the code for all of the following tasks in your one main source file (.cpp).

For installation guide:
(https://www.youtube.com/watch?v=IsAoIqnNia4&fbclid=IwAR1JnM2w_QTV0xjSI2ILhqmOE1sJri_BmoLh2HB8dwLI2YMpmzKnaKqHRlk)

For basic program designing:

https://www.youtube.com/watch?v=g4ZQgXEcCfg

1. Print "***PART 2: Tasks***" on the console
2. Move to a new line and print the following shape to console. (Hint: you can move cursor to the new line using endl or escape sequence \n; i.e. cout<<endl; or cout<<"\n";



3. On a new line, print your name and roll number separated by a comma.

**********END**********

Sample program structure

```
#include <iostream>
using namespace std;
int main()
{
	cout << "Welcome ";
	return 0;
}
```