Computer Programming / C++ Lab Schedule		
Week # *	**Date**	**Topic**
01		Introduction and using the Visual C++ software
02		Input / Output, Datatype, Arithmetic and Logic Operations
03		Conditional Statements
04 + 05		Repetition Statements
06		Functions
07		**Midterm Exam**
08		Functions
09 + 10		Arrays
11		Pointers
12		Files
13		Object Oriented Programming
14		**Final Exam**

- **Week number 1 is the second week of the semester**

Introduction to Programming Using C++
LAB 01

LAB 1.1 Opening, Compiling and Running Your First Program

- Start visual studio 2010 and create a new project.
- Write the following code then compile and run the file.

```
// This is the first program that just writes out a simple message
// Place your name here
#include <iostream>
using namespace std;
int main ()
{
	cout << "You are welcome to C++" << endl;
	cout << "have a nice day" << endl;
	return 0;
}
```

LAB 1.2 Compiling a Program with a Syntax Error

- Try to write and execute the following program:

```
// This program demonstrates a compile error.
// Place your name here
#include <iostream>
using namespace std;
int main ()
{
	cout << "You are welcome to C++" << endl
	cout << "have a nice day" << endl;
	return 0;
}
```

LAB 1.3 Running a Program with a Run Time Error

- Try to write and execute the following program:

```
// This program will take a number and divide it by 2.
#include <iostream>
using namespace std;
void  main()
{
	float number;
	int divider;
	divider = 0;
	cout << "Please input a number and then press ENTER" << endl;
	cin >> number;
	number = number / divider;
	cout << "Half of your number is " << number << endl;
}
```

LAB 1.4 Working with Logic Errors

- Try to write and execute the following program:

```
// This program demonstrates a logical error.
#include <iostream>
using namespace std;

void main()
{
       int num_of_items;
       double item_price;

       cout<<"Ener number of items";
       cin>>num_of_items;
       cout<<"Enter the item price";
       cin>>item_price;
       cout<<"The total amount = "<<num_of_items+item_price;
}
```

LAB 1.4 Working with the cout Statement

- Try to write and edit the following code to make the program show the information as shown on the right side.

`#include <iostream>`
`using namespace std;`
`int main()`
`{`
`// Fill in this space`
`// Fill in this space`
`// Fill in this space`
`// Fill in this space`
`return 0;`
`}`
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Basic and Conditional operator programming exercises

(Lab 02)

1. Write a C++ program to enter temperature in Celsius and convert it into Fahrenheit.

$$°F = \left(°C * \frac{9}{5}\right) + 32$$

2. Write a C++ program to enter temperature in Fahrenheit and convert to Celsius.

3. Write a C++ program to enter two angles of a triangle and find the third angle.
   Sum of angles of a triangle is 180°.

4. Write a C++ program to enter marks of five subjects and calculate total, average.

5. Write a C++ program to find maximum between two numbers using conditional operator.

6. Write a C++ program to find maximum between three numbers using conditional operator.

7. Write a C++ program to find minimum between three numbers using conditional operator.

8. Write a C++ program to check whether a number is even or odd using conditional operator.

If else & Switch Exercises

(Lab 03)

1. Write a C++ program to check whether a number is negative, positive or zero.

2. Write a C++ program to check whether a character is uppercase or lowercase alphabet.

3. Write a C++ program to input angles of a triangle and check whether triangle is valid or not.

4. Write a C++ program to find maximum between two numbers using switch case.

5. Write a C++ program to check whether a number is even or odd using switch case.

6. Write a C++ program to create Simple Calculator using switch case.

7. Write a C program print total number of days in a month using switch case.

8. Write a C program to check whether an alphabet is vowel or consonant using switch case.

9. What is the output of the following programs:

```
#include <iostream>
using namespace std;
void main()
{
int x=5;
int y=6;

if(x==y--)
{
      cout<<"hello from if";
}
else
{
      cout<<"Hello from else";
}
system("Pause");
}
```

```
#include <iostream>
using namespace std;
void main()
{
int x=5;
int y=6;

if(x== --y)
{
      cout<<"hello from if";
}
else
{
      cout<<"Hello from else";
}
system("Pause");
}
```

Loop Programming Exercises

(Lab 04)

1. Write a C++ program to find sum of all even numbers between 1 to n.
2. Write a C++ program to find all factors of a natural number.
3. Write a C++ program to find power of a number using for loop.
4. Write a C ++ program to check whether a number is perfect number or not.
5. Write a C++ program to print multiplication table of any number.
6. Write a C++ programs to print the following shapes.

***** ***** ***** ***** *****	***** ***** ***** ***** *****	***** ***** ***** ***** *****
* ** *** **** *****	***** **** *** ** *	* *** ***** ******* *********

Loop Programming Exercises

(Lab 05)

1. Write a C++ program to convert a number from binary to decimal.

2. Write a C++ program to find all factors of a natural number using while loop.

3. Write a C++ program to find power of a number using while loop.

4. Write a C program to enter a number and print it in words.

5. Write a C++ program to find HCF (GCD) of two numbers.

6. Write a C++ program to print Fibonacci series up to n terms:

```
Enter number of terms: 10
Fibonacci terms:
0, 1, 1, 2, 3, 5, 8, 13, 21, 34,
```

7. Write a C++ program to convert a number from decimal to binary.

Functions Exercises

(Lab 06)

1. Write a C++ program to find cube of a number using function.
2. Write a C++ program to find maximum and minimum between three numbers using function.
3. Write a C++ program to check whether a number is even or odd using functions.
4. Write a C++ program to check whether a number is prime or not using functions.
5. Write a C++ program to find all prime numbers between given interval using functions.

Example

Input

```
Input lower limit: 10
Input upper limit: 50
```

Output

```
Prime numbers between 10-50 are: 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47
```

Functions Exercises (Lab 07)

1. Write a C++ function called Draw_Box. The function takes three parameters two integers "x" and "y" and one character "s" then draw rectangle of height ="x" and width="y" using character "s".

   For example: if you call the function using x=3, and y=5 and s=$, then the function will draw the following shape:
   $$$$$
   $$$$$
   $$$$$

2. Write a C++ function called Draw_Box_2. The function takes three parameters two integers "x" and "y" and one character "s" then draw rectangle of height ="x" and width="y" using character "s".

   For example: if you call the function using x=4, and y=5 and s=$, then the function will draw the following shape:
   $$$$$
   $ $
   $ $
   $$$$$

3. Write a C++ function called Sec_to_Time. The function takes one parameter "x" represents time in seconds then the function should print the equivalent time in hours, minutes and seconds.

   For example: if you call the function using x=7322 then the output should be ad the following: 7322 seconds = 2:2:2

4. Write a C++ function called Swap. The function takes two integers "a" and "b", the function exchange the values between "a" and "b".

   For example: in the main function you have int x=5, and int y=3; then after you call the function Swap(x,y) cout<<x; will print 3 and cout<<y; will print 5,

5. Execute the each of following programs six times:

`#include<iostream>`
`using namespace std;`
 	
`void main() {`
`cout<<rand()%6;`
`system("pause");`
`}`
	`#include<iostream>`
	`using namespace std;`
	
	`void main() {`
	`srand(10);`
	`cout<<rand()%6;`
	`system("pause");`
	`}`
		`#include<iostream>`
		`using namespace std;`
		
		`void main() {`
		`srand(11);`
		`cout<<rand()%6;`
		`system("pause");`
		`}`
			`#include<iostream>`
			`#include <time.h>`
			`using namespace std;`
			
			`void main() {`
			`srand(time(NULL));`
			`cout<<rand()%6;`
			`system("pause");`
			`}`

The output at: First run: Second run: Third run: Fourth run: Fifth run: Sixth run:	**The output at:** First run: Second run: Third run: Fourth run: Fifth run: Sixth run:	**The output at:** First run: Second run: Third run: Fourth run: Fifth run: Sixth run:	**The output at:** First run: Second run: Third run: Fourth run: Fifth run: Sixth run:

Functions Exercises(Lab 08)

1. Write a C++ program to find power of a number using recursion.
2. Write a C++ program to print all natural numbers from 1 to n using recursion.
3. Write a C++ program to print even or odd numbers in given range using recursion.
4. Write a C++ program to find sum of digits using recursion.
5. Write a C++ program to find reverse of a number using recursion.
6. Write a C++ program to find GCD of two numbers using recursion.

Array (Lab 09)

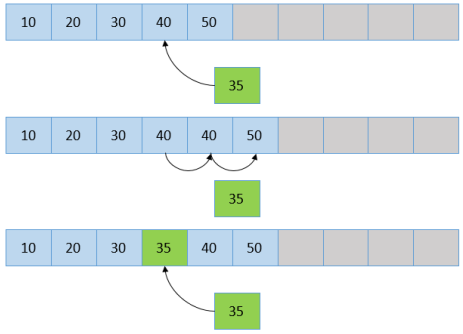
1. **Write a C++ program to count total number of even and odd elements in an array.**

2. **Write a C++ program to count total number of negative elements in an array.**

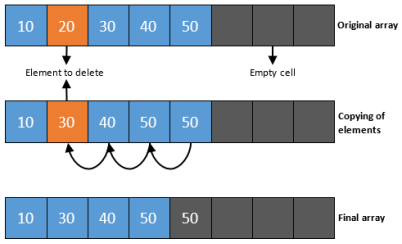
3. **Write a C++ program to copy all elements from an array to another array.**

4. **Write a C++ program to merge two arrays to third array.**

5. **Write a C++ program to insert an element in an array. The user must enter the position and the value of the element he wants insert. Any empty space should be at the end of the array, so the program will not accept any position causing a gap in the array.**



6. **Write a C++ program to delete an element from an array at specified position. The user must enter the position of the element he wants to delete. Any empty space should be at the end of the array.**



7. **Write a C++ program to find reverse of an array.**

8. **Write a C++ program to put even and odd elements of array in two separate arrays.**

9. **Write a C++ program to count frequency of each element in an array.**

10. **Write a C++ program to print all unique elements in the array.**

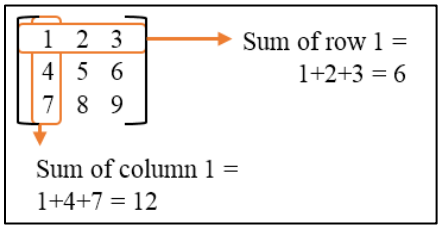
Matrices (Lab 10)

1. **Write a C++ program to add two matrices.**

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} + \begin{bmatrix} 9 & 8 & 7 \\ 6 & 5 & 4 \\ 3 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 1+9 & 2+8 & 3+7 \\ 4+6 & 5+5 & 6+4 \\ 7+3 & 8+2 & 9+1 \end{bmatrix} = \begin{bmatrix} 10 & 10 & 10 \\ 10 & 10 & 10 \\ 10 & 10 & 10 \end{bmatrix}$$

2. **Write a C++ program to find the sum of elements of each row and columns of matrix.**

Sum of rows and columns of a matrix is defined as –



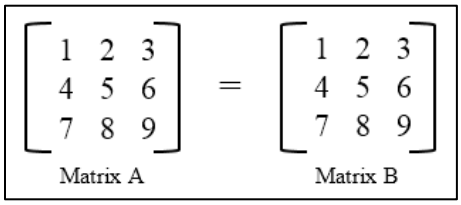
3. **Write a C++ program to multiply two matrices.**

Two matrices can be multiplied only and only if number of columns in the first matrix is same as number of rows in second matrix. Multiplication of two matrices is defined as –

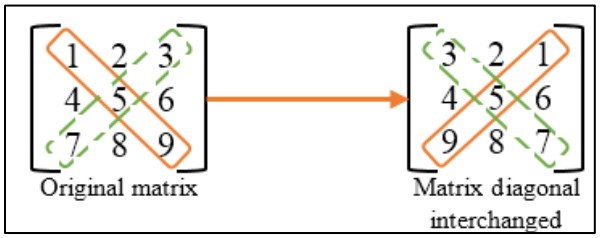
$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} e & f \\ g & h \end{bmatrix} = \begin{bmatrix} ae+bg & af+bh \\ ce+dg & cf+dh \end{bmatrix}$$

4. **Write a C++ program to check whether two matrices are equal or not.**

Two matrices are said to be equal if and only if they are of same size and they have equal corresponding entries.



5. **Write a C++ program to interchange diagonals of a matrix.**



Pointers (Lab 11)

1. **Write a C++ program to calculate the sum of two integers using pointers.**

2. **Write a C++ program to swap two integers using pointers.**

3. **Write a C++ program to read and print array elements using pointers.**

4. **Write a C++ program to copy one array to another using pointers.**

5. **Write a C++ function to take an array X, then the function must square each element in X and put them in a new array Y, then the function returns the new array Y.**

6. **Using [<string>], write a C++ program to read your full name, your address and e-mail, then the program should print your information like the following:**

Student Name: *the entered name* **/ your name contains** *N* **characters.**
Student Address: *the entered address.*
Student E-mail: the entered e-mail.

Files (Lab 12)

1. **Write a C++ program to read 10 integers from the user, then create a file; save the values in the file then close the file.**

2. **Write a C++ to open the file you have created in previous question and print its content to the user.**

3. **Write a C++ program to read an integer from the user and check whether the value is existing in the file you have created it question 1 or not.**

4. **Write a C++ program to copy the contents of the file you have created in question 1 to another file.**

5. **Write a C++ program to rename the file you have created in question 1 to be "text.txt".**

OOP (Lab 13)

Design, develop, and execute a program in C++ based on the following requirements:

1. An EMPLOYEE class is to contain the following data members and member functions:
    a. Data members:
        i. EmployeeNumber (an integer)
        ii. EmployeeName (a string of characters)
        iii. BasicSalary (an integer)
    b. Member functions:
        i. EMPLOYEE(int number, string name, int salary) // the constructor.
        ii. void setEmployeeNumber(int)
        iii. int getEmployeeNumebr()
        iv. void setEmployeeName(string)
        v. string getEmployeeName()
        vi. void setEmployeeSalary(int)
        vii. int getEmployeeSalary()

2. Create main function to create three instances of Employee class, then print the information of each instance.