Second Year B.C.A. (Science) Semester IV
(To be implemented from Academic year 2017-18)

Course Code: BCA-405
Total Contact Hours: 48 hrs.
Total Marks: 100
Lect./Week

Course Title: LAB I (C++ Practical)
Total Credits: 04
Teaching Scheme: Theory- 05

Note that these are only sample assignments. Teachers may conduct practical's by preparing similar types of examples

Sample Assignments for C++

Topic: Class, Array of Object, Dynamic Memory Allocation, Manipulators

1. Create a class for inventory of books containing author, title, price, publisher and stock as data members. Book can be sold, if stock is available, otherwise purchase will be made. Write necessary member functions for the following:

    a. To accept details from user
    b. To sale a book. (Sale contains book details & number of copies to be sold.)
    c. To Purchase a book. (Purchase contains book details & number of copies to be purchased)
    (Use new operator to allocate memory).

2. Write a C++ program to read a set of 'n' numbers (accepted from user) and print the contents of the array in the reverse order. (Use new and delete operator).

3. Write a C++ program using class called 'Point' that has x & y as integer data members. The class has the following member functions:

void setpoint(int, int)	to set the specified values of x and y in object.
Void showpoint()	to display contents of point object.
Point addpoint (point)	to add the corresponding values of x and y in Point object argument to current point object return point.

4. Write a program that consists of two classes Time12 and Time24.The first one maintains time on a 12-hour basis, whereas the other one maintains it on a 24-hour basis. Provide conversion functions to carry out the conversion from object of one type to another.

5. Define a class to represent a bank account which includes following members :
    - Data members –

a. Name
b. Account number

c. Type of account
d. Bal. amt

- Member functions –

a. To assign initial value
b. To deposit an account
c. To withdraw an account
d. To display name, account number & balance.

6. Write class sales (Salesmam_Name, Product_name, Sales_Quantity, Target). Each salesman deals with a separate product and is assigned a target for a month. At the end of the month his monthly sales is compared with target and commission is calculated as follows:

a) If Sales_Quantity> target then commission is 30% of extra sales made + 15% of target
b) If Sales_Quantity ==target then commission is 20% of target.
c) Otherwise commission is zero
d) Display the sales information along with commission obtained. (Use array of objects)

7. Write a C++ program to create a class Employee which contains data members as Emp_Id, Emp_Name, Basic_Salary, HRA, DA, Gross_Salary. Write member functions to accept Employee information. Calculate and display Gross salary of an employee. (DA=15% of Basic salary and HRA = 25% of Basic salary) (Use appropriate manipulators to display employee information in given format :- Emp_Id and Emp_Name should be left justified and Basic_Salary, HRA, DA, Gross salary Right justified with a precision of two digits for specified width)

8. Write a C++ program to create a class Person which contains data members as P_Name, P_City, P_Contact_Number. Write member functions to accept and display five Persons information. Design User defined Manipulator to print P_Contact_Number. (For Contact Number set right justification, maximum width to 10 and fill remaining spaces with '*')

9. Write a C++ program to accept 'n' numbers from user through Command Line Argument. Store all even and odd numbers in two different arrays. Display contents of both arrays.

10. Write a C++ program to create a class Student which contains data members as Roll_Number, Stud_Name, Marks in five subjects. Write member functions to accept Student information. Display all details of student along with a percentage and class obtained depending on percentage. (Use array of objects)

11. Consider a class Complex

```
Class Complex
  {
        float real;

        float imaginary;
    Public:
```

```
        //methods;
    };
```
Write the member function to subtract two Complex Numbers (Object as argument).

12. Create a C++ class for a student object with the following attributes—roll no, name, number of subjects, marks of subjects. Write member function for accepting marks and display all information of student along with total and Percentage. Display marklist with Use of manipulators.

13. Write a necessary class & member function definition for a cricket player object with data members as P_code, P_name, runs, innings_ played and number_of_times_not_out. (Use array of objects).

    The program should contain following menu:
    - Enter details of players.
    - Display details and average runs of all players.

14. Create a class Time that contains hours, minute and seconds as data members. Write the member functions:
    1. to convert a time into total number of seconds.
    2. to display the time into format like: 09:30:50

15. Write a class to represent a vector. Include member functions to perform the following tasks:

    a. Create the vector
    b. Modify the value of given element.
    c. Multiply by a scalar value
    d. Display the vector in the form (10, 20, 30…)

16. Consider the following class Person

```
Class Person
{
        char Name [20];
        char Addr [30];
        float Salary;

        int Property; //in sq. foot area
        float tax_amount;

Public:
        // methods
};
```

a) Calculate tax amount by checking salary and the property of the person
   i. For salary <5000 tax rate=0
   ii. For salary >=5000||<=10000 tax rate= 14% of salary.
   iii. For salary >=10000 tax rate =16% of salary.

b) In this tax amount add following amt depending on the size of area in sq. foot
   i. For 1000 sq. foot area amt=0.
   ii. For >1000|| < 5000 sq. foot area amt= 1000
   iii. For >5000||<= 10000 sq. foot area amt=3000.

Topic:-Inline Function, Function Overloading and Friend function

1. Write a C++ program using class with data member's int feet, float inches to represent distance and define function that takes two distance values as arguments and returns the larger one. Include a main program that accepts two distance figures from the user compare them and displays the larger using Inline function.

2. Write a menu driven C++ program using class to perform all arithmetic operation (+,-,*,/) (use inline function).

3. Write a C++ program to find volume of cube, cylinder and rectangle using function overloading

4. Write a C++ program to find area of triangle, circle, and rectangle using function overloading.

5. Create a class student containing data members:

   a. Roll_no
   b. name
   c. marks1, marks2, marks3

   Write necessary member functions:
   a. to accept details of all students
   b. to display details of one student
   c. to display details of all students (Use Function overloading).

6. Write a C++ program to calculate area of Circle, Sphere and cylinder using function overloading.

7. Create a class telephone containing name, telephone number & city as data members and write necessary member functions for the following:

   a. Search the telephone number with given name.
   b. Search the name with given telephone number.
   c. Search all customers in a given city.
   (Use function overloading)

8. Write a C++ program which will find the maximum of 3 integer numbers and maximum of 3 float numbers using function overloading.

9. Create a C++ class my date with three members dd, mm, yy. Write a menu driven program with the following options.

   - Increment date by 1 day.
   - Subtract 2 days from date.

10. Write a C++ program using class to calculate square and cube of given number using inline function.

11. Write a C++ program using class to check maximum of two integer numbers using Inline function and conditional operator.

12. Create two classes' dist1 (meters, centimeters) and dist2 (feet, inches). Accept two distances from the user, one in meters and centimeters and the other in feet and inches. Find the sum and difference of the two distances. Display the result in both (meters and centimeters) as well as feet and inches (use friend function).

13. Write a class matrix which stores a matrix of integers of given size. Write necessary member functions accept and display Matrix.

14. Write a friend function for square matrices which interchanges the elements of m^{th} and n^{th} column.

Topic: Default Argument, Static member functions and call by reference

1. Write a C++ program using class to calculate simple interest amount use default value for rate.

2. Write a C++ program using class called 'Clock' that has hours, minute and second as integer data members. The class has the following member functions:

void setclock(int, int, int)	to set the initial time of clock object.
void showclock()	to display time in hh:min:sec format.

Write a function tick( ) which by default increment the value of second by 1 or according to user specified second. The clock uses 24 hours format.

3. Write a C++ program to define function power to raise a number m to a power n the function takes a double value for m. and integer value for n and return the result correctly use a default value of 2 for n to make the function calculate squares when this argument is omitted.

4. Write a C++ program using class with function replace (char* str, char c1, char c2) every occurrence of c1 in str should be replaced with c2 and return number of replacement it makes use default value for char c2.

5. Write a C++ program to create a class Employee with data members as Emp_Name, No_of_Days_worked, Pay_Rate_Per_Day. Write necessary member functions to calculate and display the salary of Employee. (Use default value for Pay_Rate_Per_Day)

6. Write a C++ program to create a class Novel which contains data members as N_Id, N_Name, N_Author. Write member functions to accept and display Novel information also display Count of novels. (Use Static data member to maintain Count of novels)

7. Write a C++ program to create a class Item with data members Item_Code, Item_Name, Item_Price. Write member functions to accept and display Item information also display number of objects created for a class. (Use Static data member and Static member function)

8. Design a class which contain static data member and member function Print() which displays number of times print function is performed irrespective of the object responsible for print using static data member.

9. Write a C++ program to create a class which contains two data members. Write member functions to accept, display and swap two entered numbers using call by reference.

Topic:-Constructor and Destructor

1. Write a C++ program to create a class which contains single dimensional integer array of given size. Write a member function to display sum of given array elements. (Use Dynamic Constructor to allocate and Destructor to free memory of an object)

2. Write a C++ program using class which contains two data members of type integer. Create and initialize the object using default constructor, parameterized constructor and parameterized constructor with default value. Write a member function to display maximum from given two numbers for all objects

3. Write a C++ program to create a class Part which contains data members as Part_Id, Part_Name, Part_Price. Create and Initialize all values of Part object by using parameterized constructor and copy constructor. Display the values of Part object. (Part_price should be right justified with a precision of two digits)

4. Write a C++ program to create a class Date which contains three data members as dd, mm, yyyy. Create and initialize the object by using parameterized constructor and display date in dd-mon-yyyy format. (Input: 29-12-2016 Output: 29-Dec-2016) Perform validation for month.

5. Create a C++ class for a student object with the following attributes—roll no, name, number of subjects, marks of subjects. The number of subjects varies for each student. Write a parameterized constructor which initializes roll number, name and number of subject and creates the array for marks dynamically, write member function for accepting marks and display all information of student also display the student having the highest percentage.

6. Create a class FDAccount containing members as:

   Fdno, Name, Amt, Interest_rate, Maturity_amt, Number_of_months

Use parameterized constructor to set appropriate details, where interest rate should be default argument. Calculate maturity amt using interest rate and display all the details.

7. Write a c++ program to implement class complex. Use default constructor to initialize 0 to both real & imaginary part. Use copy constructor .Write necessary member functions to accept, display, add & multiply two complex numbers.

8. Define a class string. Use different constructors and do the following
   a. Create un-initialized string objects.
   b. Create objects with string constants.
   c. Concatenate two strings.
   d. Display a desired string.

Topic: Operator Overloading

1. Create a class time that contains hours, minute and seconds as data members. Write the member function to overload operator '+' to add two object of type time,(Use Parameterized constructor to accept values for time).

2. Create a class CString to represent a string.
   A) Overload the + operator to concatenate two strings
   B) Overload <=, == to compare 2 strings.
   C) Overload – (unary) to change the case.

3. Create a class Rational to represent a Rational number. Write member functions to accept and display Rational numbers. Perform the Basic Arithmetic operation: Addition, Subtraction, Multiplication and Division using operator overloading for two Rational number.
4. Write a class matrix which stores a matrix of integers of given size. Write necessary member functions and overload the following operators.

   - (binary) subtract two matrices and stores the result in third.
   + multiplies two matrices and stores the result in third.
   1(equals to) returns 1 if two matrices are same.

5. Define a c++ class fraction

```
class fraction
{

long numerator;
  long
  denominator;
public:

fraction(long n=0,long d=0);
}
```

Overload the following operators as member
or friend. Unary++(pre and post both)

Overload as friend functions operators << and >>.

6. Define a class for 3 dimensional points. Write necessary member functions to accept and display the point object.
   Overload the following operators:

Operator	Example	Purpose
* (Binary)	p3=p1*p2	multiplies coordinates of point p1 with p2.
- (Binary)	p3=p2-p1	subtracts coordinates of p1 from p2.

7. Create a class Array which contains
   - int *ptr
   - int n

   Write a menu driven program :
   - to Accept an array from user
   - to display it.
   - to add two arrays using operator overloading.
   - to subtract two arrays using operator overloading.

8. Create a class currency containing rupees and paiseas data members. Write necessary member functions using operator overloading for the following:
   1. currency (long int rup=0,int paise=0) C currency
   2. &operator += (currency &) (to add one currency to another)
   3. currency & 1. operator - = (currency &) (to subtract one currency from another)

   Accept Rupee & paise from user and display it.

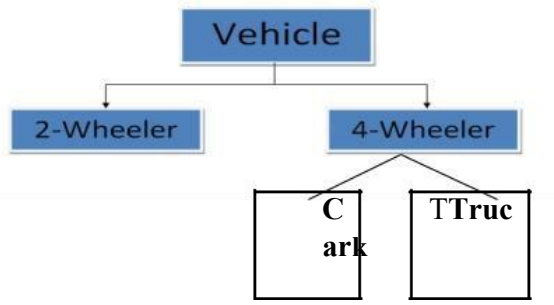
9. Consider a class Matrix Class Matrix
   {
   int a[3][3];
   Public:

   //methods;
   };
   Overload the – (Unary) should negate the numbers stored in the object.

Topic: Inheritance

1. Create base class called shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called cylinder and rectangle from the base shape. Add to the base class, a member function get_data(), print_data() to initialize base class data members and display_area(), display_perimeter() to compute and display area and perimeter of shape.

2. Design the classes using following hierarchical inheritance



Each class has constructor for initialization and display function. Write a program to accept details of n cars and display the details.

3. Implement multiple and hierarchical inheritance. The class Allrounder derives information from both Bowler and Batsman classes which in turn derive information from the class Cricketer. Define all four classes and write a program to create, update and display information contained in Allrounder objects display the object having the highest number of runs.

Topic: Virtual Function

Q.1) Create a base class Shape. Derive three different classes Circle, Rectangle and Triangle from Shape class. Write a C++ program to calculate area of Circle, Rectangle and Triangle. (Use pure virtual function).

Q.2) Create a base class Conversion. Derive three different classes Weight (Gram, Kilogram), Volume (Milliliter, Liter), Currency (Rupees, Paise) from Conversion class.

Write a C++ program to perform read, convert and display operations. (Use Pure virtual function)

Q.3) Create a base class Media. Derive two different classes Book (Book_id, Book_name, Publication, Author, Book_price) and CD (CD_title, CD_price,CD_capacity) from Media. Write a C++ program to accept and display information of both Book and CD. (Use pure virtual function)

Q.4) Create a base class Roundshape(radius). Derive three different shapes as Circle, Sphere andcylinder(height) from Roundshape.

```
Class Roundshape
{

        Protected : float
        radius; Public:
        static float Pi;

                Roundshape(float); //default
                argument virtual float area( )=0;
};
```

Write a C++ program to calculate area of Circle, Sphere and cylinder.

Topic: File Handling

Q.1) Write a C++ program to read the contents of a text file. Count and display number of characters, words and lines from a file. Find the number of occurrences of a given word present in a file.

Q.2) Write a C++ program to read the contents of a "Sample.txt" file. Store all the uppercase characters in"Upper.txt", lowercase characters in "Lower.txt" and digits in "Digit.txt" files. Change the case of each character from "Sample.txt" and store it in "Convert.txt" file.

Q.3) Write a C++ program to create a class Department which contains data members as Dept_Id, Dept_Name, H.O.D., Number_Of_staff. Write necessary member functions to

i. Accept details from user for 'n' departments and write it in a file "Dept.txt".
ii. Display details of department from a file.
iii. Count the number of objects stored in a file.

Q.4) Create a C++ class MyFile containing:

- fstream f;
- char *filename;

Write necessary member Functions using operator
overloading: << To display the contents of a file
>> To write the contents into a file

Q.5) Write a C++ program which will accept 'n' integers from user through command line argument. Store Prime numbers in file "Prime.txt" and remaining numbers in "Others.txt".

Q.6) Write a program in C++ that copies one file to another by changing the case of every alphabet in the file. Also count the total number of characters, words and lines in the file.

Q.7) Create a class Distance containing Feet and Inches as data members. Write a C++ program to read distance from user, store it in the file and to read it from the file and display it to the user.

Use operator overloading for the following:

1. <<to write distance object in inches format to a file
2. >>to read inches from File.

Q.8) Create a C++ class MyFile containing data member:

Fstream fp;
Char *fn;

Write necessary member Functions using operator overloading:

1.+ F3=F1+F2 Put contents of F1 and F2 in F3.
2.- -F3 Changes the case of all upper and lower case characters in F3.

- RollNo
- Name

- Marks

Write necessary member functions:

1. to accept the details and store it into the file “school.dat”
2. to read the details from file and display it.
3. to update a given record into the file.

Q.10) Create a C++ class Medicalshopee
containing - medicine_no
- medicine_name
- qty

- price

Medicine details are stored into the file “medical.txt” .When any medicine has to be sold, it is first searched into the file, if found, the qty is decremented by that much qty to be sold.

Q. 11) Write a C++ program to implement the following:

Define a class ‘city’ with data members name and STD code. Accept ‘n’ cities with STD codes from user. Store this data in the file ‘cities.txt’. Write a program that reads the data from file cities.txt into the array. Output the list of city with STD codes. Write a search function to search a city by name and display its STD code.

Q. 12) Assuming that a text file named FIRST.TXT contains some text written into it, write a function named copy_upper(), that reads the file FIRST.TXT and creates a new file named SECOND.TXT contains all words from the file FIRST.TXT in uppercase.

Q. 13) Assuming that a text file named FIRST.TXT contains some text written into it, write a function named vowelwords(), that reads the file FIRST.TXT and creates a new file named SECOND.TXT, to contain only those words from the file FIRST.TXT which start with a vowel.

Q.14) Create a C++ class MyFile containing data
member: fstream fp;
Char *fn;

Write member function for the following:
void display() // reads the files

void append(); // append a character to a file
void fileclose(); // close the file

Q.15) Write a C++ program to create a text file which stores employee (emp_id,emp_name,emp_sal) information. Write a menu driven program with the options

- Append
- Modify
- Display
- Exit

Q.16) A file contains a list of person name and their telephone numbers in the following form: Ajay 12345
Vijay 98765

The names contain only one word and the names and telephone numbers are separated by white spaces. Write a program to read the file and output the list in two columns. Implement the following tasks.

- Determine the telephone number of the specified person.
- Determine the name if a telephone number is known.
- Update the telephone number, whenever there is a change.

Topic: Template

Q.1) Write a program in C++ to perform the following using the function template concepts:

- To read a set of integer numbers
- To read a set of float numbers
- Find out average of the integer numbers
- Find out average of the float numbers

Q.2) Define a class template Array to represent an array of any type and size.
Define appropriate constructors for the class.

Define member functions to Accept and display an Array object.

Find the largest element in the array object.
Example: Array<int, 10> a; //creates an array of the type int and size 10.

Q.3) Using Standard Template Library(STL), write a program to obtain the list of files present in current directory and display these files in sorted order of name, type and size.