**List of Experiments**

| **Name of Laboratory:** Programming for Problem Solving – II Laboratory | | | | |
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| **List of practical/ Experiments** | | | | |
| **Sr No** | **Objective** | **Performance** | **Study** | **Self-Study** |
| 1 | **LEARN CONCEPTS OF OOP**<br>1. Explain Object Oriented Paradigm with figure.<br>2. Explain basic Concepts of OOP with example<br>a. Class<br>b. Object<br>c. Data Encapsulation<br>d. Data Abstraction<br>e. Data Hiding<br>f. Inheritance<br>g. Polymorphism<br>3. State various benefits of OOP | YES | YES | - |
| 2 | **CONCEPTS OF OOP USING C++**<br>1. What is C++?<br>2. Give the Applications of C++.<br>3. State and explain differences between C & C++.<br>4. Draw and explain the structure of C++.<br>5. Explain insertion (<<) and extraction (>>) operators of C++.<br>6. What are manipulators? Explain endl and setw with example.<br>7. W.A.P. to show the effects of manipulator endl and setw.<br>8. What is type conversion? Explain with example.<br>9. W.A.P. to show the effect of type conversion.<br>10. What is dynamic initialization? Explain with example.<br>11. W.A.P. to check the effect of dynamic initialization.<br>12. Explain reference variable with example.<br>13. W.A.P. that will show the effect of reference variable.<br>14. Write a function using variables as arguments toswap the values of a pair of integers using call byvalue, call by address and call by reference.<br>15. Explain the working of scope resolution operator (::) with example. | YES | YES | - |

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| 3 | **DEFAULT ARGUMENTS AND FUNCTION OVERLOADING**<br>1. WAP to print following using default arguments<br>repchar() // prints 45 times asterisks (*)<br>repchar ('=) // prints 45 times (=)<br>repchar('+',30) // prints 30 times (+)<br>2. WAP to add two matrices using default argument.<br>3. WA function called zero smaller() uses two arguments. Use return by reference to the function concept and set a smaller value to 0.<br>4. WAP that prints various types of data using function overloading.<br>5. WAP that prints a character on screen using function overloading<br>6. WA function power() to raise a number m to power n. The function takes a double value for m and int value for n, and returns the value (results) correctly. Use default argument 2 for n and m to make a function to calculate squares when argument is not passed. WAP for the same.<br>7. Write overloaded functions to convert ascii to int and ascii to float. | YES | - | - |
| 4 | **CLASS AND OBJECTS**<br>1. Create a class player with the following data membersname, age, runs, hi, lo, tsts, avg<br>Write member functions for each of the following<br>a. To get the data<br>b. To display the data<br>c. To calculate the average of the player<br>2. Create a class item with the following data members item code, cost, qty, total_price<br>Write member functions for each of the following<br>a. To get the data<br>b. To display the data<br>c. To calculate the total price of the item<br>3. Create a class book with following data members bookname, authorname, rate, qty<br>Write member functions for each of the following<br>a. To get the data<br>b. To display the data<br>c. To calculate the total price of the book<br>4. Create a time with following data members<br>int h,m,s<br>Write member functions for each of the following | YES | - | - |

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| | a. To get the data in number of seconds<br>b. To set the data in number of seconds<br>c. To display the data<br>d. To convert seconds into h, m, s<br>5. Create a student with the following data members rollno,name, marks[6],per, class<br>Write member functions for each of the following<br>a. To get the data<br>b. To display the data<br>c. To calculate percentage<br>d. To calculate class based on percentage<br>6. Add constructors and destructors in above five examples.<br>7. Write a program to count number of objects created for any class. | | | |
| 5 | **ARRAY OF OBJECTS**<br>1. Create a class player with following data members Player, name, Team name, Batting average, Read data for 10 payers, Use constructors and destructors properly and write member function for each of the following<br>a. To get the data<br>b. To display the data<br>c. Sort it according to the batting average<br>d. Print a team wise sorted list of player's name with their batting average<br>2. Create class book with following data members book name, author name, Qty, price<br>Read data for 10 books, Use constructors and destructors properly and write member function for each of the following<br>a. To get the data<br>b. To display the data<br>c. To find total price (i.e. qty * price)<br>d. Sort it according to the total price<br>3. Declare a class catalog with following data members title,author, year_of_publication, no_of_copies<br>create array of 15 objects, Use constructors and destructors properly and write member function for each of the following | YES | - | - |

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| 6 | **OPERATOR OVERLOADING**<br>1. Rewrite complex class (from assignment 5) using operator overloading concept. i.e. overload (+,-,*,/)<br>2. Rewrite matrix class (from assignment 5) using operator overloading concept. i.e. overload (+,-,*,/)<br>3. Rewrite date class (from assignment 5) using operatoroverloading concept. i.e. overload (++) operator<br>4. Create class string with following data member<br>char str[20], for performing various comparison operations,<br>overload >, <, ==, != operators for two string objects.<br>5. Create a class distance with following data membersint feet<br>float inches<br>write an overloaded operators <, >, ==, != two compare two distance objects.<br>6. Write a program to compare two date class objects byoverloading <, >, ==,!= operators.<br>7. Write a program to compare two time class objects byoverloading <, >, ==,!= operators.<br>8. Rewrite assignment 1&2(from assignment 6) using +=,-=, *= & /=operator overloading.<br>9. Rewrite student class (from assignment 5) using comparison overloaded operators < & >. | YES | - | - |
| 7 | **DATA CONVERSION**<br>1. WAP to convert from ton to Kg & gms and vice-versa. Create two classes for the same. Class tons (with ton as data member)and Class kilo (with kg and gms as data members)Use formula 1 ton = 100 kg, 1kg = 1000gms<br>2. Create a class time12 that store hh:mm:ss in 12 hour format along with am or pm, createanother class time24 that store time hh:mm:ss in 24 hour format. Write a Conversion function to convert from one class object to another class object.<br>3. Write a program to perform following operations on distance calss. 1)d1 = 2.0 and 2) float m = d1 | YES | - | - |

a. To get the data

b. To display the data

c. To search the particular title, if exists then display that particular record

4. Create a student with the following data members rollno, name, marks[6], per, class
Write member functions for each of the following

a. To get the data

b. To display the data

c. To calculate percentage

d. To calculate class based on percentage

e. To sort the students percentagewise

f. Use constructors and destructors

5. Create class complex with following data members real and imaginary, Use constructors and destructors properly and for performing various arithmetic operations write member functions for each of the following

a. Addition function to add two complex no

b. Subtraction function to add two complex no

c. Multiplication function to add two complex no

d. Division function to add two complex no

e. Function to get data and to print data

6. Create class matrix with following data members
int array[size][size] (size can vary), Use constructors and destructors properly and for performing various arithmetic operations write member functions for each of the following

a. Addition function to add two matrices

b. Subtraction function to add two matrices

c. Multiplication function to add two matrices

d. Division function to add two matrices

e. Function to get data and to print data

7. Create a class date with following data member int day, month and year
   Use constructors and destructors properly and write member functions for each of the following

e. To set the date

f. To get the date

g. To Print the date into dd/mm/yy format

h. Nextday function, to increment the day by one, while incrementing day by one be sure for two things

i. Must increment month by one if day is 29, 28, 30 or 31 in a particular month

ii. Must increment year accordingly

8. Create a class distance with the following data members int feet, float inches
   Use constructors and destructors properly and write member functions for the following

i. To get the data

j. To display the data

k. Add two distance objects

9. Create a class time with the following data members int h,m,s(input data in seconds only)
   Use constructors and destructors properly and write member functions for each of the following

a. To get the data

b. To display the data

c. To convert the seconds into h, m ,s

d. To add two time objects

10. Create class string with the data member as char str[20],
    Use constructors and destructors properly and write member functions for each of the following

l. To get the data

m. To display the data

n. To concatenate two string objects

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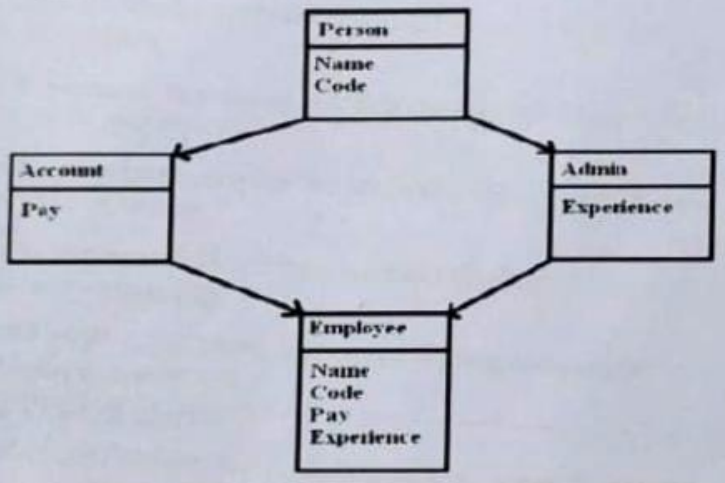
| 8 | **INHERITANCE AND CONTAINERSHIP**<br>1. Assume that Circle is defined using radius and Cylinder is defined using radius and height.<br>Write a Circle class as base class and inherit the Cylinder class from it. Develop classes such that user can compute the area of Circle objects and volume of Cylinder objects. Area of Circle is pie *radius*radius, while volume of Cylinder is pie*(radius * radius)*height.<br><br>2. Consider a class network as shown in figure given below. The class Employee derives information from both Account and Admin classes which in turn derive information from the class Person. Define all the four classes and write a program to create, update and display the information contained in Employee objects.<br>  <br><br>3. Define class employee which has fname and lname as data member. Define following:<br>1. Constructor for employee class with default arguments<br>2. Print function<br>Derive a class called hourly_worker (with wage and hours as data members). Define following:<br>1. Constructor for hourly_worker class with default arguments<br>2. Getpay() function that calculates and returns the pay and<br>3. A print function<br>4. Write a class Box to draw a rectangle. Derive a class NewBox to add a data member character. Use this character and draw a particular shape instead of lines.<br>5. Create a class publication with title and price. Use necessary constructors, destructors and functions. Derive two classes books (member page_count), tape(member mins). Write necessary functions. | YES | - | - |

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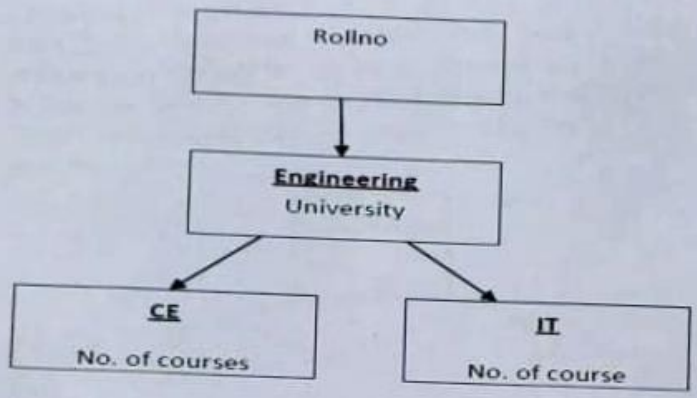
| | 6. Modify above program with two base classes. One as publication and create another sales (member totalsales). Now, Derive two classes books (member page_count), tape(member mins) from publication and sales. Use necessary constructors, destructors and functions.<br>7. Define Inheritance. Explain public, private and protected inheritance with example.<br>8.<br>  <br>Create classes as shown in figure. Write a program to create, update and display information using inheritance<br>9. What is containership? Rewrite above program using containership. | | | |
| 9. | **POINTERS**<br>1. Create a class Account. It has three data member account id, name and balance. Define function to assign value and display value. Define function that search account number given by the user. If account number exists, print detail of that account. Write a program using array of pointers to the object. Declare at least 5 account and print details.<br>2. Create class Country with country name, capital and population as data member. Country name and capital should be defined as char *.<br>3. Write a program using array of pointers to the object.Read data at least for 5 countries and sort it country wise.<br>4. Define and Discuss Pure Virtual Function<br>5. What is pointer to void?<br>6. Explain pointer to objects with example. | YES | - | - |
| 10 | **COPY CONSTRUCTOR AND FRIEND FUNCTION**<br>1. Write a program for string class using copy constructor.<br>2. Explain Friend function and its characteristics. Define a class matrix with an integer array of 3X3 as a data member. Define a friend function which adds two matrix objects and returns resultant matrix object.<br>3. Explain and demonstrate, how virtual function to achieve runtime polymorphism?<br>Define Friend Function. Create two classes DM and DB which | YES | - | - |

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| | store the value of distances.<br>DM stores distances in meters and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object stores the results may a DM object or DB object, depending on the units in which the results are required. The display should be in the format of feet and inches or meters and centimeters depending on the object on display.<br>1 Feet = 0.3048 Meter 1 Meter = 3.28 Feet<br>1 Inch = 2.54 Centimeter 1 Centimeter = 0.3937 Inch | | | |
| 11 | **FILE HANDLING**<br>1. Write a program using file handling concepts to read from "Country" and "capital" file and display data for the same.<br>2. Write a program using file handling to demonstrate theconcepts of get() and put() functions<br>3. WAP to read from one file and write it to another file.<br>4. Write a program to demonstrate use of read() and write()functions for person class.<br>5. WAP to copy contents of one file to another.<br>6. WAP to create array of 10 numbers and write even and odd numbers into two different files. | YES | - | - |
| 12 | **EXCEPTION HANDLING AND TEMPLATES**<br>1 What is this pointer? Write a complete program to illustratethe use of this pointer.<br>2 What is Copy Constructor? Explain with example<br>3 What is an exception? What are the advantages of usingexception handling in a program? Illustrate C++ exception handling mechanism.<br>4 What is Exception? Explain Exception Handling Mechanism. Write a program that demonstrates use of multiple catch. Add at least three catch blocks in yourProgram.<br>5 What is STL? Explain in detail<br>6 What is Generic Programming? How it is implemented in C++. Write General format of class templates and function Template. Write program toswap Number using Function Template. Function prototype is given below:<br>void swap(int, int , float , float )<br>Swap two integer number and swap two float number.**[Summer-2013]**<br>7 Explain with the help of an example why templates are used in programming? | YES | - | - |
| 13 | 1. WAP to implement stack<br>2. WAP to implement Simple queue | YES | - | - |
| 14 | 1. Write OpenGL programs to draw triangle.<br>2. Write OpenGL programs to draw tetrahedron.<br>3. Write OpenGL programs to draw torus. | YES | - | - |
| 15 | Any OEP problem selected by a group of students (3 to 4 fromthe same batch only) | YES | - | - |