PUNE INSTITUTE OF COMPUTER TECHNOLOGY
DHANKAWADI, PUNE-43

LIST OF LAB EXPERIMENTS

ACADEMIC YEAR: 2023-2024

Date: 10/08/2023

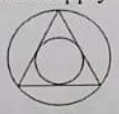
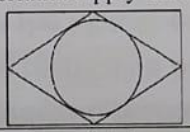
DEPARTMENT: COMPUTER ENGINEERING

SUBJECT: Object Oriented Programming and Computer Graphics Laboratory (210247)

CLASS: S.E. **SEMESTER: I**

Instructions:

- Program codes with sample output of all performed assignments are to be submitted as softcopy.
- Assignments should be submitted by students in the form of journal, consisting of hand written write up of each assignment(Title, Date of Completion, Objectives, Outcomes, Problem statement, S/W & H/W requirements, Theory-concept in brief, algorithm, flowchart, mathematical model(if applicable), test cases, conclusion/analysis.

GROUP	LAB EXP NO	TOPIC OF ASSIGNMENT
		GROUP A (1,3,5 OOP and 2,4,6 CG)
A	1.	Implement a class Complex which represents the Complex Number data type. Implement the following operations: 1. Constructor (including a default constructor which creates the complex number 0+0i). 2. Overloaded operator+ to add two complex numbers. 3. Overloaded operator* to multiply two complex numbers. 4. Overloaded << and >> to print and read complex Numbers.
	2.	a) Write C++ program to draw the following pattern. Use DDA line and Bresenham's circle drawing algorithm. Apply the concept of encapsulation.  **OR** b) Write C++ program to draw the following pattern. Use DDA line and Bresenham's circle drawing algorithm. Apply the concept of encapsulation. 
	3.	Develop a program in C++ to create a database of student's information system containing the following information: Name, Roll number, Class, Division, Date of Birth, Blood group, Contact address, Telephone number, Driving license no. and other. Construct the database with suitable member functions. Make use of

		constructor, default constructor, copy constructor, destructor, static member functions, friend class, this pointer, inline code and dynamic memory allocation operators-new and delete as well as exception handling.
	4.	Write C++ program to draw a concave polygon and fill it with desired color using scan fill algorithm. Apply the concept of inheritance.
	5.	Imagine a publishing company which does marketing for book and audio cassette versions. Create a class publication that stores the title (a string) and price (type float) of publications. From this class derive two classes: book which adds a page count (type int) and tape which adds a playing time in minutes (type float). Write a program that instantiates the book and tape class, allows user to enter data and displays the data members. If an exception is caught, replace all the data member values with zero values.
	6.	Write C++ program to implement Cohen Southerland line clipping algorithm.
		GROUP B (7,9 OOP and 8,10 CG)
	7.	Write a C++ program that creates an output file, writes information to it, closes the file, open it again as an input file and read the information from the file. Consider class person, open a file and write as many objects as the user wants then read and display the entire contents of the file.
B	8.	a) Write C++ program to draw 2-D object and perform following basic transformations, Scaling, Translation, and Rotation. Apply the concept of operator overloading **OR** b) Write C++ program to implement translation, rotation and scaling transformations on equilateral triangle and rhombus. Apply the concept of operator overloading
	9.	Write a function template for selection and insertion sort that inputs, sorts and outputs an integer array and a float array.
	10.	a) Write C++ program to generate snowflake using concept of fractals. **OR** b) Write C++ program to generate Hilbert curve using concept of fractals. **OR** c) Write C++ program to generate fractal patterns by using Koch curves.
		Group C (11,13 OOP and 12,14 CG)
	11.	a) Write C++ program using STL for sorting and searching user defined records such as personal records (Name, DOB, Telephone number etc) using vector container. **OR** b) Write C++ program using STL for sorting and searching user defined records such as Item records (Item code, name, cost, quantity etc) using vector container.
	12.	a) Design and simulate any data structure like stack or queue visualization using graphics. Simulation should include all operations performed on designed data structure. Implement the same using OpenGL. **OR** b) Write C++ program to draw 3-D cube and perform following transformations on it using OpenGL a) Scaling b) Translation c)Rotation about an axis (x/y/z) **OR** c) Write OpenGL program to draw Sun Rise and Sunset

	13.	Write a program in C++ to use map associative container. The keys will be the names of states and the values will be the populations of the states. When the program runs, the user is prompted to type the name of a state. The program then looks in the map, using the state name as an index and returns the population of the state.
	14.	a) Write a C++ program to control a ball using arrow keys. Apply the concept of polymorphism. **OR** b) Write a C++ program to implement bouncing ball using sine wave form. Apply the concept of polymorphism. **OR** c) Write C++ program to draw man walking in the rain with an umbrella. Apply the concept of polymorphism. **OR** d) Write a C++ program to implement the game of 8-puzzle. Apply the concept of polymorphism. **OR** e) Write a C++ program to implement the game Tic-Tac-Toe. Apply the concept of polymorphism.
		Mini-Projects/ Case Study
	15.	Design and implement game / animation clip / Graphics Editor using open source graphics library. Make use of maximum features of Object Oriented Programming.

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