**Lab Tasks**

**Lab 1: First OGL Program**

* Created my first OGL program.
* Learned to create a window, set a window size and position.
* Learned to set the background display color.
* Learned to implement sound file in my program

**Lab 2: 2D scenery**

* Learned about OpenGL Geometric Primitives.
* Draw basic primitives like POINT, LINE, QUADRILATERAL, TRIANGLE, POLYGON etc.
* Create a house using GL\_POLYGON.

**Lab 3: Lab Activities**

* Successfully ran DinoPolyLine File which takes a .txt/.dat file and displays a Dino.
* Completed DinoTiling using a for loop which creates a new Viewport for each iteration and creates a dino.
* Completed Dino invert Tilling(Fliping) using nested for loops.
* Completed Dino Zoom in and out using Keys, which zooms in on up arrow key and zooms out on down arrow key and repost the display with updated value.
* Make a Viewport Dynamic i.e Roaming as known as Panning (To move the view in a specific direction using arrow keys).Completed viewport panning in which viewport is variable and can be increased and decreased using keyboard.
* Program that display Text on screen.
* Created a parameterized Regular polygon (n-gon) using lineTo and moveTo function.
* Create a Circle by using Polygon.
* Implemented the code for Arc.
* Implemented the code for Rosette (Example from book).
* Created a circle using equation: x + r\*cosØ, y + r\*sinØ

**Lab 4: Attach menu**

* Implemented and created an Arrow using moveTo and lineTo functions.
* Figure 3.27 rosette
* Introduction to Design and Use of Menu i.e Implemented and completed Figure 2.44 menu (attached menu with right mouse button)

**Lab 5: Turtle graphics and Paint program**

* Draw shape on screen when the key is pressed (c for circle) and (t for triangle).
* Created my own Paint Program:
  + Learned to render/write text on screen
  + Used vector array to draw dots, clicking left mouse button will create dots and right mouse clears the dots (push and pop in array)
  + Created a shape class which is inherited by different shapes like Triangle, circle, pentagon, cylinder
  + Used keyboard handler to render and delete shapes on screen, on pressing a key a shape is drawn and deleted. (push and pop in vector array)
* Implemented Point2 class and Turtle Graphics:
  + Example 3.5.2 (motifs)
  + Practice Exercises-> 3.5.1 – 3.5.6 (motifs and meanders)
  + Practice Exercises-> 3.5.7 – 3.5.9 (Polyspirals)

**Lab 6: Mario Game**

* Created a Mario 2D game, learned about RGBApixmap, Enum datatype, reading a bmp file, setting a chromakey, Special keyboard functions and how to move a bmp on screen using keyboard interactions.

**Lab 7: Canvas Class**

* Canvas Class implementation with some more classes including: Point2, IntRect, RealRect.
* Created my own 3 functions drawSun(), drawStar(), drawSmiley() using Canvas Class.

**Lab 8: Spider 2D game**

* Spider game lab:
  + Physics engine to check collision between spider & bullet.
  + Bounce back logic of spider if it reaches the wall of window.
  + Object modeling Bullet.
  + Use of gettime() function to determine speed of spider at each point second.

**Lab 9: Transformation for Windmill**

* Usage of 2D transformations
* Usage of push & pop matrix for transformations of windmill blade
* Timer Function which increments the value of angle so the windmill keeps rotating.
* Plane (object) landing using Timer function.

**Lab 10: Rotational Symmetry**

* Using Transformations to create flake and Star.
* Dino transformations.

**Lab 11: Lab Transformations**

* Modeling and animating a gear wheel.
* Drawing symmetric object (snowflake) using a Turtle.

**Lab 12: Hierarchical Modeling**

* Model a 2d car using transformations and animate it using Timer function, attached menu to start, restart & exit the program.
* Example of 2D robot for hierarchical modeling, by using these solutions:
  + Independent / Non – hierarchical
  + Dependent / Hierarchical.

**Lab 13: 3D rendering**

* Example 5.6.2: A scene composed of wireframe objects.
* Example 5.6.3. A 3D scene rendered with shading.

**Written Assignments**

* OGL
* Importance of Push and Pop Matrix
* What is left handed and right handed coordinate system, explain with examples.
* Difference b/w CPU and GPU.
* Hierarchal Modeling
* World Window to Viewport Mapping Numerical.