I. DETAILED LAB EXERCISE PLAN

Experiment 1: Introduction to OpenGL:

- **What is OpenGL?**
- **What is GLU/GLUT?**
- **What is OpenGL Architecture?**
- **Setting up the environment.**
- **First OpenGL Program: This initializes a window of Green color.**

 # Discuss all the steps & functions in the program.

Experiment 2: Drawing a line

- **Draw a line using equation of line Y=m*X+C.**
- **Draw a line using DDA algorithm for slope m<1 and m>1.**
- **Draw a line using Bresenham algorithm for slope m<1 and m>1.**

 # Take the input from user for all the three scenarios i.e value of (x1 , y1) and (x2 , y2).

Experiment 3: Drawing a Circle and an Ellipse

- **Draw the circle with the help of polar equations**
- **Draw the circle with the help of mid-point method.**
- **Draw the Ellipse with the mid-point method.**

 # Take the value of radius, major axis and minor axis as input from the user.

Experiment 4: Filling -Area

- **WAP to fill the polygon using scan lines.**
- **WAP to fill a region using boundary fill algorithm using 4 or 8 connected approaches.**
- **WAP to fill a region using flood fill algorithm using 4 or 8 connected approaches.**

 # Take the value of seed point, intensity of new color as input from user.

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Experiment 5 & 6: Viewing and Clipping

- Write an interactive program for line clipping using Cohen Sutherland line clipping algorithm.
- Write an interactive program for line clipping using Liang-Barsky line clipping algorithm.
- Write an interactive program for polygon clipping using Sutherland – Hodgeman polygon clipping algorithm.

 # Take the window coordinates as input from the user, also take polygon coordinates as input.

Experiment 7 & 8: Basic Two3 & Three Dimensional Transformations

- Write an interactive program for following basic transformation.
  - Translation
  - Rotation
  - Scaling
  - Reflection about axis.
  - Reflection about a line Y=mX+c and aX+bY+c=0.
  - Shear about an edge and about a vertex.

 # Perform all the experiment for 3-D transformation.
 # Take the following values as input from user: Theta (angle of rotation),translation factor, scaling factor and other values. Make necessary assumptions.

Experiment 9: Drawing Bezier curves.

- **Write a program to draw a cubic spline.**
- **WAP to draw a Bezier curve.**

 # Take necessary values as input from the user like degree of the Bezier curve.

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Experiment 10: Animation & Event Handling using Mouse and Keyboard

- **WAP to implement following scenarios**
    - Mouse Handling
    - Mouse Motion Handling
    - Keyboard Handling
    - Animation Using Mouse

 # Take necessary values as input from the user like time, how long you want animation to run.

Experiment 11&12: Creating 3D Shapes like Cube, Sphere and others.

- **WAP to create various 3D objects:**
    - **CUBE**
    - **SPHERE**
    - **CONE**
    - **TEAPOT.**

#Make necessary assumption for creating the 3-D objects, you can use inbuilt functions to simplify the coding, lightning and shading effect should also be there.

Suggestive reads:

1. OpenGL: Programming Guide, the Official Guide to Learning OpenGL.

Authors: Dave Shreiner, John Kessenich, Bill Licea-Kane,The Khronos OpenGL ARB Working Group.

2. OpenGL Programming Guide Paperback – 2008

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