

**SSN COLLEGE OF ENGINEERING, KALAVAKKAM**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**UCS1712 – GRAPHICS AND MULTIMEDIA LAB**

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**Lab Exercise 5: 2D Transformations in C++ using OpenGL**

To apply the following 2D transformations on objects and to render the final output along with the original object.

1) Translation

2) Rotation

a) about origin

b) with respect to a fixed point (xr,yr)

3) Scaling with respect to

a) origin - Uniform Vs Differential Scaling

b) fixed point (xf,yf)

4) Reflection with respect to

a) x-axis

b) y-axis

c) origin

d) the line  $x=y$

5) Shearing

a) x-direction shear

b) y-direction shear

Note: Use Homogeneous coordinate representations and matrix multiplication to perform transformations. Divide the output window into four quadrants. (Use LINES primitive to draw x and y axis.