**Graphics and multimedia**

**Create and Render 3D Objects Using Polygons and Apply Basic Color and Shading Techniques**

**EXPERIMENT** : 6

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**AIM**

To create and render 3D objects (such as cube or sphere) using polygonal modeling and apply: Flat shading ,Basic color techniques

**Procedure**

1. Define the 3D object using polygon faces (triangles or quadrilaterals).
2. Assign color values to faces or vertices.
3. Apply shading models:
   * Flat shading assigns one color per face.
   * Vertex coloring blends colors between corners.
4. Use 3D plotting functions to render the object with shading.
5. Optionally, simulate lighting effects using surface normals.

**PROGRAM**

import matplotlib.pyplot as plt

from mpl\_toolkits.mplot3d.art3d import Poly3DCollection

import numpy as np

vertices = np.array([[0,0,0], [1,0,0], [1,1,0], [0,1,0],

[0,0,1], [1,0,1], [1,1,1], [0,1,1]])

faces = [[vertices[j] for j in [0,1,2,3]],

[vertices[j] for j in [4,5,6,7]],

[vertices[j] for j in [0,1,5,4]],

[vertices[j] for j in [2,3,7,6]],

[vertices[j] for j in [1,2,6,5]],

[vertices[j] for j in [4,7,3,0]]]

colors = ['red', 'blue', 'green', 'yellow', 'cyan', 'orange']

fig = plt.figure()

ax = fig.add\_subplot(111, projection='3d')

poly3d = Poly3DCollection(faces, facecolors=colors, edgecolors='black', linewidths=1)

ax.add\_collection3d(poly3d)

ax.set\_xlabel('X')

ax.set\_ylabel('Y')

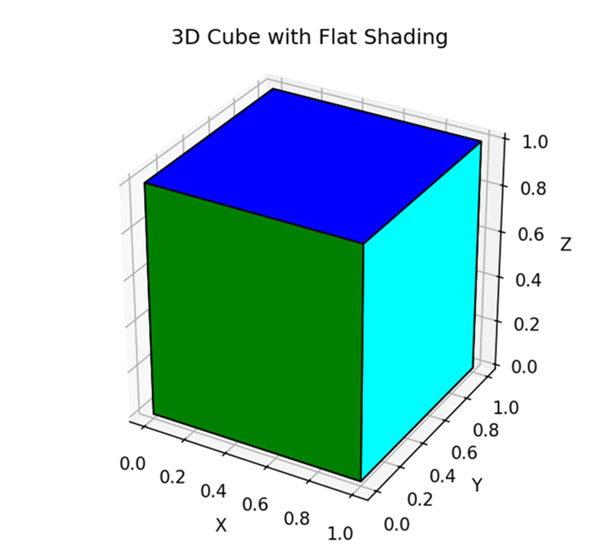
ax.set\_zlabel('Z')

ax.set\_title('3D Cube with Flat Shading')

ax.set\_box\_aspect([1,1,1])

plt.show()

**OUTPUT**



**Result**

3D polygonal objects were successfully created and rendered. **Basic color and flat shading techniques** were applied, enhancing the visual representation of the cube.