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Ex. No.

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Create and Render 3D Objects Using Polygons and

Apply Basic Color and Shading Techniques

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 (e.g., triangles or quadrilaterals).

2.

Assign color values to faces or vertices.

3.

Apply simple shading models:

o

Flat shading

assigns one color per face.

o

Vertex coloring

blends colors between corners.

4.

Use 3D plotting to render the object with shading.

5.

Visualize the effect of light using normal approximation (optional).

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)



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# Set view

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()

Result:

D polygonal objects were successfully created and rendered. Basic color and flat shading

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techniques were applied to enhance visual representation.

