Question One: Choose the correct answer

(7 Marks)

1. The transformation in which the size of an object can be modified in x-direction, y-direction and z-direction called ___.
   a. Translation  
   b. Scaling  
   c. Rotation  
   d. All of these

2. Which of the following Wavefront file formats defined the texture vertices points for attaching textures?
   a. vn  
   b. f  
   c. vt  
   d. g

3. ___ include the intensity and positions of light sources and background illumination required for a scene graph.
   a. Lighting specifications  
   b. Surface rendering  
   c. Viewing specifications  
   d. Object rendering

4. **Octrees Model** is a technique uses for ___.
   a) Modelling 3D objects  
   b) Shading 3D objects  
   c) Illumination 3D objects  
   d) None of these

5. Which of the following shading models compute the color in each of the three vertices of a triangle based on the corresponding normal vectors?
   a. Phong shading  
   b. Gouraud shading  
   c. Constant shading  
   d. Interpolated shading

6. Which of the following classes is used to specify the properties needed for an interpolator such as: loop count, when the interpolation starts, duration of interpolation, and etc.?
   a. Appearance  
   b. Vector3f  
   c. PositionInterpolator  
   d. Alpha

7. Which technique is used to model and display the following object?

   a. Octrees  
   b. Geometry Arrays  
   c. Voxel  
   d. Sweep representation
Question Two: Match the following terms with its description (8 Marks)

| ( ) | Transform3D | a | A class that defines the geometry and colors of a cube centered at the origin with different colors on each face. |
| ( ) | createSceneGraph() | b | A 3-element vector that is represented by single-precision floating point x,y,z coordinates |
| ( ) | PositionPathInterpolator | c | A class stores 3D transformations as matrix in homogeneous coordinates. |
| ( ) | ColorCube | d | The approximation of a curved surface by polygons |
| ( ) | tessellation | e | A class defines all rendering state that can be set as a component object of a Shape3D node. |
| ( ) | Shape3D | f | A method can incorporate all geometric objects, information about their surfaces and dynamic changes. |
| ( ) | Appearance | g | A class that enables a movement along a polylines. |
| ( ) | Vector3f | h | A class provides definitions of common properties for objects that represent some form of 3D geometric shape. |

Question Three: Answer Five (5) of the following questions: (25 Marks)

Essay Questions:

1. Compare and contrast **Spot light** with **Ambient light** sources.
2. Contrast the **Alpha Class** that uses for Interpolator specifications?
3. Describe the **CSG Scheme Model** technique for modelling 3D objects?
4. List the sequence of steps involved in adding **fog** to your scene graph. Describe the typical classes used in each step.
5. Identify **TWO** types of **sound sources** and explain its attributes.
6. Discuss the effects that can be added by particle systems.
Question Three: Answer the following question: (10 Marks)

1. Write the structure of Java code to draw the following Scene graph tree.

2. The following code draws a ColorCube. Complete this program to include a Directional Light and Fog effect.

```java
public BranchGroup createSceneGraph() {
    BranchGroup objRoot = new BranchGroup();

    TransformGroup objTrans = new TransformGroup();
    Transform3D tfRotate = new Transform3D();
    objTrans.addChild(new ColorCube(0.3));
    tfRotate.rotY(Math.PI / 4);
    objTrans.setTransform(tfRotate);
    objRoot.addChild(objTrans);

    BoundingSphere bounds = new BoundingSphere(new Point3d(0.0, 0.0, 0.0), 100.0);
    Color3f lightColour = new Color3f(1.0f, 1.0f, 1.0f);
    Vector3f lightDir = new Vector3f(-1.0f, 0.0f, -0.5f);
    //
    //
    objRoot.compile();
    return objRoot;
}
```

Good Luck