2015O1236

International Institute of Information Technology, Hyderabad
CSE 251 : Spring 2017 : Computer Graphics
Final Exam

Please answer concisely and precisely. Use illustrative diagrams instead of words wherever appropriate.

Max. Points: 100 marks [Time: 120 Mins]

1. (a) Give the sequence of transformation needed to compute the location of a bead tied to a spoke of the wheel moving forward (clockwise) on a flat surface. Assume the parameters of motion and wheel structure as variables. [10]
   (b) What are the conditions when Perspective and Orthographic projection matrices converge (do write matrix form). [5]
   (c) Briefly describe various modules of a 3D Graphics pipeline. [5]

2. (a) Differentiate between object and image precision algorithm for visible surface determination. Derive formulation for depth computation used in the z-buffering algorithm. [10]
   (b) Construct BSP tree for following scene (show intermediate steps). [12]

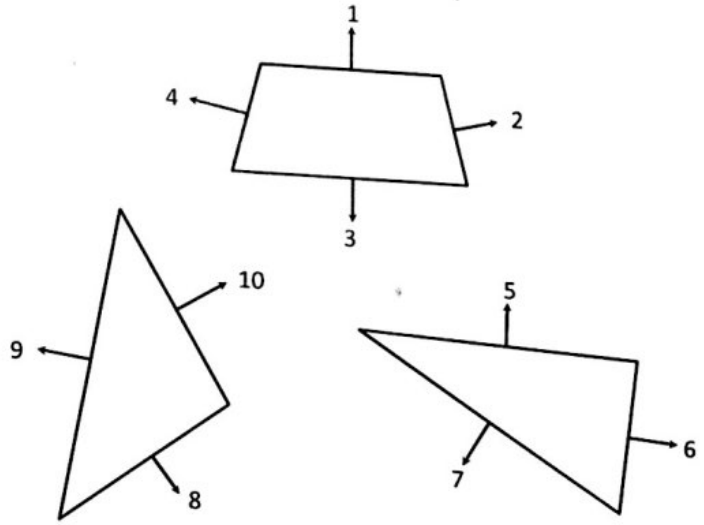

Figure 1: Scene with Polygons.

3. (a) Explain Phong's model of specular reflection. Give the construction of halfway vector based specular reflection model and when it is more suitable to use this model. [8]
   (b) Briefly explain Gourard and Phong shading methods. Provide key limitation of former method addressed by the latter one. [8]

4. (a) Using examples, explain the concept of *parity checking*, *edge coherence* and *active edge table* in the context of scan converting a filled polygon. Explicitly list the special concerns/cases related to such scan conversion. **[10]**

   (b) Outline the Sutherland-Hodgman algorithm for polygon clipping. Provide intermediate steps for employing this algorithm for clipping the polygon given below. **[12]**

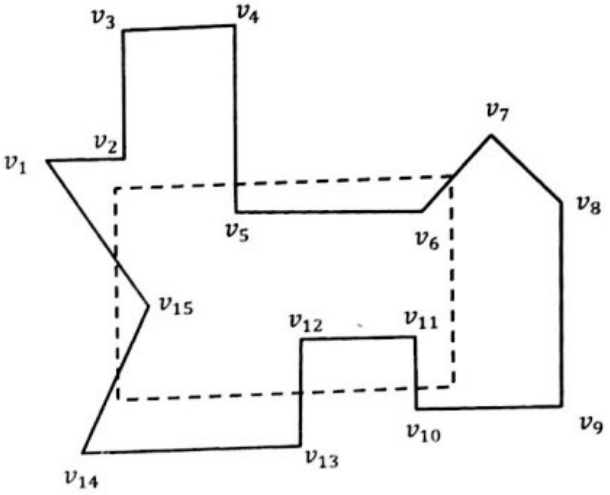

Figure 2: Polygon Clipping: Rectangle with dotted line as the clipping window

5. (a) Explain the concept of Ray Tracing. Show by example, how transparent and mirror-like objects can be handled in Ray Tracing using tree structures ? **[10]**

   (b) Derive the formulation for representing a point inside triangle using the Barycentric coordinate system. **[10]**