

KATHMANDU UNIVERSITY  
End Semester Examination  
February/March, 2019

FEB 20 2019

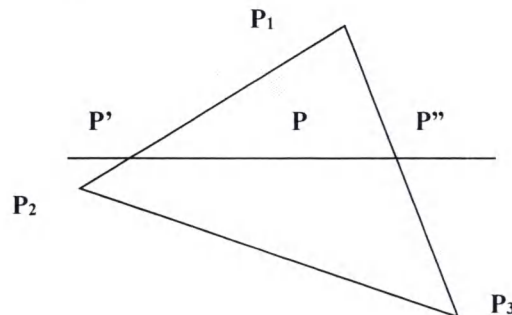
Level : B.Sc.  
Year : III  
Time : 2 hrs. 30 mins.

Course : COMP 342  
Semester : I  
F.M. : 40

SECTION "B"  
[6 Q.×4=24 marks]

Attempt *ANY SIX* questions.

1. Give two applications where computer graphics and image processing are combined together? Compare and contrast between Visualization and Presentation Graphics (applications of Computer Graphics) with relevant examples? [1+3]
2. How much time is spent scanning across each row of pixels during screen refresh on a raster system with resolution of  $1280 \times 1024$  and a refresh rate of 60 HZ? Describe basic video controller refresh operations with required block diagram? [2+2]
3. What are the advantages of cartesian coordinate system over homogeneous coordinate system? Show that two successive reflections about any line passing through the coordinate origin is equivalent to a single rotation about the origin using homogeneous coordinate? [1+3]
4. What transformations are performed during view coordinate to Normalized view coordinate transformation in 2D viewing? Clip the line  $LI (-1, 5, 3, 8)$  against the rectangular window  $R (-3, 1, 2, 6)$  using Cohen-Sutherland algorithm? [1+3]
5. How does basic scan line method determine which surfaces are hidden? Describe depth buffer method for hidden surface detection technique with suitable example and also lists its advantage over back face detection method? [1+3]
6. When a light source is relatively far away from a polyhedron, the diffuse reflection determined by the Phong formula varies little within each polygonal face. Why? How can you compute the color of  $P, P', P''$  using Intensity interpolation technique from the given figure? [1+3]



7. Write Short notes on: [2+2]
  - a. XYZ Color model
  - b. Key-Frame systems

SECTION "C"  
[2Q. × 8 = 16 marks]

Attempt *ANY TWO* questions.

8. Prove that  $x = y$  at the boundary between two octants in a Circle? Derive all the required decision parameters and write an algorithm for plotting the line with  $|m| \leq 1$  using Bresenham algorithm? Digitize the region 1 of an ellipse with  $r_x = 6$  and  $r_y = 8$  and center at origin using Mid-point algorithm? [1+ 5+2]
9. Find the transformation co-ordinates of a pyramid whose co-ordinates are A(0,0,0), B(1,0,0), C(0,1,0) and D(0,0,1) after performing a **cabinet projection** that makes an angle  $45^\circ$  with horizontal axis in  $X_v, Y_v$  plane ? Derive the composite transformation matrix for rotating any 3D object by  $30^\circ$  about an axis passing through origin and point (10, 0, 10) using homogeneous coordinate system? [3+5]
- 10.
- a) Write three assumptions under which the flat shading of polygon facets provides an accurate rendering for an object? Explain Specular reflection with supporting mathematical relations? [1+3]
- b) Find the form of the matrix for reflection about a line  $L$  with slope  $m$  and y intercept  $(0, b)$ ? [4]