

(Time: 2½ hours)

Total Marks: 75

- N. B.: (1) **All** questions are **compulsory**.  
 (2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.  
 (3) Answers to the **same question** must be **written together**.  
 (4) Numbers to the **right** indicate **marks**.  
 (5) Draw **neat labeled diagrams** wherever **necessary**.  
 (6) Use of **Non-programmable** calculators is **allowed**.

**1. Attempt any three of the following:**

15

- What is computer graphics? How image is displayed on video display device?
- Explain the method of circle drawing using midpoint circle algorithm.
- Distinguish between active and passive graphics devices.
- What are the various problems of aliasing? Explain with example.
- Explain different types of video formats.
- Explain the acceptance and rejection test using bit codes in Cohen-Sutherland line clipping algorithm.

**2. Attempt any three of the following:**

15

- Perform mapping from window to viewport coordinate transformation.
- Using homogeneous coordinate transformation matrix, apply following sequence of transformation to a unit square centered at origin.
  - Translation by factor(1,1)
  - Rotation by angle  $\theta=90^\circ$
- Obtain the general combined matrix for scaling about an fixed point P(xf,yf).
- Write a note on affine and perspective geometry.
- Explain projection with the help of orthographic projection.
- Shear a unit cube situated at origin with a shear transformation matrix:

$$T_{\text{shear}} = \begin{pmatrix} 1 & 1.5 & 3 & 0 \\ 0.8 & 0 & 1 & 0 \\ 0.5 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

**3. Attempt any three of the following:**

15

- What is viewing? Explain canonical view volume.
- Explain camera model and viewing pyramid with diagram.
- Explain different properties of Bidirectional Reflectance Distribution Function (BRDF).
- Write a note on photometry.
- Explain Grassmann's laws.
- What is colorimetry? Explain color with the help of colorimetry.

**[TURN OVER]**

4. Attempt any three of the following:

15

- a. Explain z-buffer algorithm with advantages and disadvantages.
- b. What are the basic tests in Warnock's algorithm? Explain.
- c. Explain parametric representation of ellipse with example.
- d. Write a note on B-Spline curves.
- e. Compare all visible surface detection methods.
- f. Construct Bezier curve of order 3, with 4 polygon vertices A(1,1) B(2,3) C(4,3) D(6,4) for values of  $u, 0 \leq u \leq 1$  where  $p(u)$  is a point on curve with values for  $u = (0, 1/4, 1/2, 3/4, 1)$ .

5. Attempt any three of the following:

15

- a. What is an image? Explain different file formats of an image.
- b. What is an animation? Explain character animation.
- c. Explain the concept of median filtering with suitable example.
- d. Distinguish key frame animation with procedural animation.
- e. Explain different types of deformation.
- f. Explain JPEG compression process in detail.

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