(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

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

2. Attempt *any three* of the following: 15

a. Perform mapping from window to viewport coordinate transformation.
b. Using homogeneous coordinate transformation matrix, apply following sequence of transformation to a unit square centered at origin.
   (i) Translation by factor(1,1)
   (ii) Rotation by angle $\theta=90^0$
c. Obtain the general combined matrix for scaling about an fixed point P(xf,yf).
d. Write a note on affine and perspective geometry.
e. Explain projection with the help of orthographic projection.
f. Shear a unit cube situated at origin with a shear transformation matrix:

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

3. Attempt *any three* of the following: 15

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

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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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