I.T.
Extra

(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? Explain computer graphics applications and software.
   b. Explain the operation of CRT with a neat labelled diagram.
   c. Distinguish between raster scan display device and random scan display device.
   d. Consider a line AB with A= (0, 0) and B= (-5,-5). Apply a simple DDA algorithm and calculate the pixels on the line.
   e. Explain the acceptance and rejection test using bit codes in Cohen-Sutherland line clipping algorithm. List the steps of the algorithm and give suitable example to explain the concept.
   f. Explain Liang-Barsky algorithm for clipping a line and also find the clipping coordinates for a line PQ where P=(10,10) and Q=(60,30), against window with $(x_{wmin}, y_{wmin})=(15,15)$ and $(x_{wmax}, y_{wmax})=(25,25)$.

2. **Attempt *any three* of the following:** **15**
   a. Describe transformations and matrices in detail.
   b. Using homogeneous coordinate transformation matrix, rotate the triangle ABC with A= (2, 3), B= (5, 5), and C= (4, 3) by an angle 45^0 about the point (1, 1).
   c. Write a short note on reflection through an arbitrary line in brief.
   d. Shear a unit cube situated at origin with a shear transformation matrix:

$$T_{shear} = \begin{bmatrix} 1 & -0.85 & 0.25 & 0 \\ -0.75 & 1 & 0.7 & 0 \\ 0.5 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

   e. Define vanishing point and also explain vanishing point in different perspective projection in detail.
   f. What is meant by view volume? Explain it with different types of projections.

3. **Attempt *any three* of the following:** **15**
   a. Explain with neat labelled diagram stages in 3D viewing pipeline.
   b. Explain different coordinates systems and matrices in detail.
   c. What is light? Explain Radiometry in brief.
   d. Explain different properties of Bidirectional Reflectance Distribution Function (BRDF).

[TURN OVER]

e. Explain any two color spaces in detail.
f. Write a short note on chromatic adaptation.

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

a. Write a short note on back face removal technique.
b. What is meant by BSP trees? Explain algorithm for construction of it with example.
c. Explain visible surface ray tracing in brief with neat labelled diagram.
d. Explain parametric representation of hyperbola.
e. Explain implicit and explicit curve representation in detail.
f. Explain Bezier Surfaces in detail and state it's any five properties.

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

a. What is an animation? Explain any two principles of animation in detail.
b. Explain procedural techniques in brief.
c. Explain different types of deformation in detail.
d. What is an Image? Explain any five image formats.
e. Distinguish between lossy and lossless compression.
f. Explain the concept of histogram equalization. Equalize the following histogram for L=8.

Gray Level	0	1	2	3	4	5	6	7
No. of pixel	790	1023	850	656	329	245	122	81