

2. Attempt any FOUR parts of the following :—
- (a) Show that the composition of two rotations is additive by concatenating the matrix representations for $R(\theta_1)$ and $R(\theta_2)$ to obtain $R(\theta_1) \cdot R(\theta_2) = R(\theta_1 + \theta_2)$.
 - (b) Show that a reflection about the line $y = -x$ is equivalent to a reflection relative to y axis followed by a counterclockwise rotation of 90° .
 - (c) Draw a flow chart illustrating the logic of Sutherland-Hodgeman polygon clipping algorithm.
 - (d) Explain the concept of fractured segment with suitable diagram if required. You are also required to explain the structure of display file in brief.
 - (e) Find the instance transformation which places a half-size copy of the square $A(0, 0)$, $B(2, 0)$, $C(2, 2)$ and $D(0, 2)$ defined in a master coordinate system into a world coordinate system in such a way that the centre of the square is at $(-3, -3)$ in the world coordinate system.
 - (f) Describe shearing transformation with suitable example.
3. Attempt any TWO parts of the following :—
- (a) Explain viewport clipping (extension of Cohen-Sutherland algorithm) method for a three-dimensional object.
 - (b) Devise an algorithm to reflect an object (three-dimensional) about an arbitrarily selected plane.

- (c) Write an algorithm to perform a one-point perspective projection of an object.
4. Attempt any TWO parts of the following :—
- (a) Construct enough points on the Beizer curve whose control points are $P_0(4, 2)$, $P_1(8, 8)$ and $P_2(16, 4)$ to draw an accurate sketch.
- (i) What is the degree of the curve ?
- (ii) What are the coordinates at $U = 0.5$?
- (b) What is back force removal algorithm ? Explain with a sketch. Also state its limitations.
- (c) In parametric representation of curves, there are few methods by which curve can be represented.

Define and compare any three of the following :—

- (i) Hermite Interpolation
- (ii) Beizer Curve
- (iii) B-Spline Curve
- (iv) NURBS Curve