

GUJARAT TECHNOLOGICAL UNIVERSITYM. E. Sem. – IInd - Examination – June/July- 2011

Subject code: 1720905

Subject Name: Computer Aided Design

Date: 27/06/2011

Time: 10:30 am – 01:00 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain the concept of 'Homogeneous Coordinate System' and its importance. **07**
- (b) Enlist the different steps of algorithm for generating a circle along with the flowchart. **07**
- Q.2** (a) Plot the hermite cubic curve having endpoints $P_0(1, 3)$ and $P_1(7, 2)$. The tangent vector for end P_0 is defined by a line joining P_0 and another point $P_2(10, 8)$, whereas the tangent vector for end P_1 is defined by a line joining P_1 and another point $P_3(6, 0)$. Also plot the curve in the same graph, if the point P_3 is changed to $(9, 6)$ with the other things remaining the same **07**
- (b) What is the function of a Graphic Standard? Explain any two of the Graphic Standards with their structure. **07**
- OR**
- (b) A sphere with centre point $C(10, 20, 30)$ and radius 30mm is translated by $3i - 4j + 5k$, then rotated by 30° around Z axis and then it is scaled by 2 units in X direction and 4 units in Y direction. Find the final coordinate of the Centre point of Sphere **07**
- Q.3** (a) $P(0, 0)$, $Q(2, 2)$ & $R(5, 2)$ are the vertices of a triangle PQR which is to be rotated at angle of 45° about (a) the origin and (b) about a point $X(-2, -2)$. Give transformed coordinates of P, Q and R for both the cases. **07**
- (b) Distinguish between conventional machine design procedure and Computer Aided design Procedure **07**
- OR**
- Q.3** (a) An ellipse is defined by the center point $(8, 12)$ and has a major radius of 10 units and minor radius of 4 units. Determine the various points on the ellipse in the first quadrant, if the increment between each point is 30° . Assume that the ellipse is oriented such that the major axis and minor axis are parallel to X and Y axes respectively. **07**
- (b) Explain the different techniques used for generating the picture on the CRT screen. **07**
- Q.4** (a) A triangle ABC with vertices $A(1, 1)$, $B(7, 1)$ and $C(1, 6)$ is to be reflected about the line $6y - 3x - 18 = 0$. Determine : **07**
- (i) the concatenated transformation matrix and
- (ii) the final coordinates of the vertices of a reflected triangle.
- (b) Plot the Bezier curve having endpoints $P_0(1, 3)$ and $P_3(7, 2)$. The other control points are $P_1(5, 6)$ and $P_2(6, 0)$. Plot for values for $u = 0, 0.1, 0.2, \dots, 1$, if the characteristic polygon is drawn in the sequence $P_0 - P_1 - P_2 - P_3$. **07**

OR

- Q.4** (a) Explain C-Rep and B – Rep in detail **07**
(b) Explain the concept of Data structure and Database management in CAD. **07**

- Q.5** (a) Sketch the area defined by the relation $x^2 + y^2 - 6(x^2 + y^2)^{1/2} + 9 \leq 4$ **07**
(b) Explain the concept of Feature based modeling. **07**

OR

- Q.5** (a) Sketch the surface model of a solid that simultaneously satisfies the following conditions: **07**

$$x^2 + y^2 \leq z^2/4$$

$$z \geq 2$$

$$z \leq 9$$

- (b) Explain different kinds of surfaces in detail. **07**
