

**GUJARAT TECHNOLOGICAL UNIVERSITY****M. E. Sem. – II<sup>nd</sup> - 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  $30^\circ$  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  $45^\circ$  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  $30^\circ$ . 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**

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