

**GUJARAT TECHNOLOGICAL UNIVERSITY****M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013****Subject code: 710802****Date: 04-06-2013****Subject Name: Computer Aided Machine Design****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 clearly the various modeling facilities available in graphics package with its applications in mechanical engineering. **07**
- (b) Enlist the various softwares available in CAD. Give the advantages and applications of any three in details. **07**

- Q.2** (a) What do you mean by scan conversion? Write down the algorithm with flow chart to scan convert a circle using Bresenham's method with neat sketch. **07**
- (b) Using Bresenham's line algorithm, find the pixel positions along the line path between end points (20,10) and (30,18). **07**

**OR**

- (b) What is the importance of 2D transformation in mechanical engineering? Derive the matrix for rotation transformation. **07**

- Q.3** (a) Write short note on Importance of Homogeneous coordinate system in the form of matrix transformation. **07**
- (b) Prove that a uniform scaling ( $S_x = S_y$ ) and a rotation form a commutative pair of operations, but that, in general, scaling and rotation are not commutative operations. **07**

**OR**

- Q.3** (a) Prove that in case of three dimensional rotations of object the rotations are noncommutative. **07**
- (b) Explain relative advantages and disadvantages of CSG approach and B-rep approach. **07**

- Q.4** (a) Derive the equation for Bezier curve for four points using DeCasteljau algorithm. **07**
- (b) Explain with neat sketch the major surface entities provided by CAD system. **07**

**OR**

- Q.4** (a) State the characteristics of B spline curve. Compare it with Bezier curves. **07**

- Q.4** (b) Explain with neat sketch the Parametric representation of a surface of revolution. **07**

- Q.5** (a) Explain step by step procedure with commands used for the development of solid modeling of Shaft-Gear assembly using any 3D CAD software. **07**
- (b) Prepare an algorithm and write a C/C++ program for the design of Bell Crank Lever. **07**

**OR**

- Q.5** (a) Explain Johnson's method of optimum design stating basic steps and classification. **07**
- (b) A thin walled spherical vessel is to be designed for storing gas under pressure such that  $t \ll D$  where  $t$  = wall thickness and  $D$  = mean diameter of the vessel. Design the diameter  $D$  for maximizing gas storing capacity, the thickness  $t$  and optimum choice of the material. The materials available are: **07**
1. Aluminum Alloy
  2. Plain Carbon Steel
  3. Cast Steel
  4. Low Alloy Steel.

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