

**B.TECH**  
**(SEM VII) THEORY EXAMINATION 2017-18**  
**COMPUTER AIDED DESIGN**

Time: 3 Hours

Total Marks: 100

**Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

**1. Attempt all questions in brief.**

**2 x10 = 20**

- a. What do you mean by computer Aided design [CAD]?
- b. Write short note on optical character recognition.
- c. Discuss local coordinate system.
- d. What is concatenated transformation?
- e. State difference between: analytic curves and synthetic curves.
- f. Discuss the generation of 2D curves.
- g. What are the different types of geometric modeling.
- h. Explain the types of surface entities.
- i. What do you mean by discretization?
- j. Write limitation of finite element method.

**SECTION B**

**2. Attempt any three of the following:**

**10 x 3 = 30**

- a. State the various types of output devices used in CAD workstation. Explain, with neat sketch, any three output devices.
- b. Using Bresenham's line algorithm, find the pixel positions along the line between end points (15,8) and (28,16).
- c. Line  $L_1$  has end points (1,2,7) and (5,6,1), while line  $L_2$  has end points (7,3,4) and (3,9,10)
  - (I) Find the parametric equations of the lines.
  - (II) Find the tangent vectors of the lines.
  - (III) Are the two lines parallel or perpendicular?
  - (IV) Are the two lines intersecting? If yes, find the point of intersection.
- d. Sketch the wireframe model defined by the set of points :  
 $\{ (x, y, z) : x + y \leq 3, x + y + 3 \geq 0, x - y \geq 3, y - x \leq 3, z \geq -2, \text{ and } z \leq 2 \}$
- e. Explain the various steps required to solve mechanical problem using finite element analysis.

## SECTION C

### 3. Attempt any two part of the following:

10 x 1 =10

- (a) Explain, with neat block diagram, conventional product cycle.
- (b) Discuss criteria for selection of CAD/CAM system.
- (c) Discuss mid – point circle algorithm.

### 4. Attempt any one part of the following:

10 x 1 =10

- (a) A triangle ABC with vertices A (30, 20), B(90, 20), and C (30, 80) is to be scaled by a factor of 0.5 about a point X(50, 40). Determine: (i) the composite transformation matrix ; and (ii) the coordinates for the vertices for a scaled triangle.
- (b) Explain with neat sketches, the following two-dimensional mappings :
  - (i) Translational mapping (ii) Rotational mapping (iii) General mapping.

### 5. Attempt any one part of the following:

10 x 1 =10

- (a) An ellipse has major axis of 10 units and minor axis of 8 units. If the center of ellipse is (5, 6, 3) write the parametric equation of an ellipse.
- (b) Generate the Bezier curve for the following control points :  
A (1, 1), B (4, 3), C(5, 2) and D(3, 1).

### 6. Attempt any one part of the following:

10 x 1 =10

- (a) what are the various types of sweeps used in solid modeling ?
- (b) Sketch the solid model defined by the set of points :  
{ ( x, y, z ) :  $x^2 + y^2 \leq z^2/4$ , and  $2 \leq z \leq 9$  }

### 7. Attempt any one part of the following:

10 x 1 =10

- (a) State and describe the various types of elements used in the finite element analysis in detail.
- (b) Two springs, having stiffnesses 12 and 8 N/mm respectively, connected in series. One end of the assembly is fixed and a force of 60 N is applied at other end. Using the finite element method, determine : (i) the displacements at nodes 2 and 3; (ii) the deflections of individual springs; and (iii) the reaction force at support.

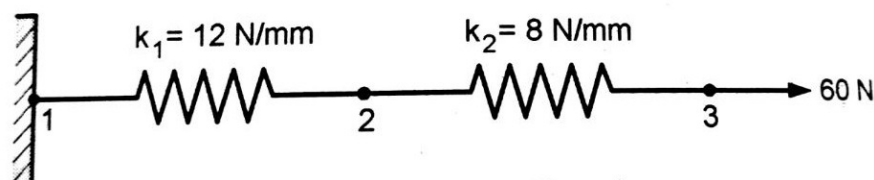


Figure 1