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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 :
$\{ (x, y, z) : x^2 + y^2 \le z^2/4, \text{ and } 2 \le z \le 9 \}$

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 diflections of indivisual springs; and (iii) the reaction force at support.

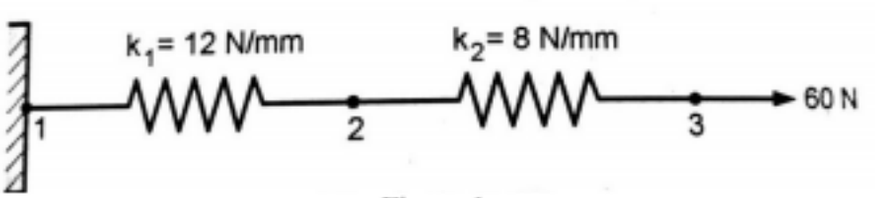

Figure 1