(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 140701   Roll No.

B.Tech.

(SEM. VII) THEORY EXAMINATION, 2015-16

COMPUTER AIDED DESIGN

[Time:3 hours]   [Total Marks:100]

Section-A

1. Attempt **all** parts. All parts carry equal marks. Write answer of each part in short. $(10×2=20)$

   (a) Diferentiate between random and raster scan.

   (b) What do you mean by order of continuity of curves?

   (c) Mention the differences between interpolation and approximation.

   (d) Describe any two differences between Bezier curve and Cubic spline curve.

(e) Differentiate between plane surface and ruled surface with neat sketch.

(f) What is Bezier surface?

(g) Describe the most common primitives used in solid modelling briefly.

(h) List the differences between CAD/CAM.

(i) Define Element Stiffness Matrix.

(j) What are various sweep representations and discuss anyone.

Section-B

Attempt **any five** Questions from this section. $(10 \times 5 = 50)$

2. Explain the method to generate the surface of revolution. Find the point $(0.25, 90°)$ on the surface of revolution of a line segment with endpoints $(1, 1, 0)$ and $(5, 2, 0)$. This line segment is rotated about x axis.

3. How the B-spline surface is generated? What are the continuity conditions that are required for a B-spline patch?

4. Determine the parametric representation of the line segment between the position vectors P1 [1 1] and P2 [4 5]. What are the slope and tangent vector for this line?

5. Explain the Bresenhem's line drawing algorithm and write the steps for line joining points (20, 10) and (30, 18).

6. Discuss the RGB and CMY model of colour and explain the importance of colour in CAD/CAM application.

7. Derive the mid-point circle algorithm and show various steps for a circle radius r=10 for the first quadrant from x=0 to x=y.

8. Explain and derive matrix for the following transformation 2D transformations:

   a) Reflection   b) Shear

   c) Scaling   d) Rotation

9. Consider the assemblage of three springs as shown in fig. 1. Calculate the displacement of the nodal points 2 and 3.
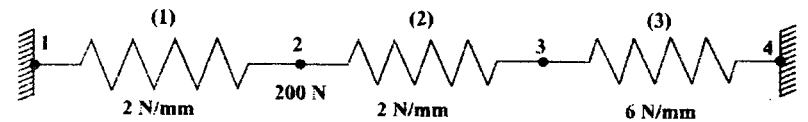

Fig. 1

Attempt **any two** questions from this section   **(2×15=30)**

10. Derive parametric equation of Bezier curve using Bernestien polynomial. Also find the equation of Bezier curve and its mid-point using four control points (20, 20), (60, 80), (120, 100) and (150, 30).

11. Write parametric equation of Hermite cubic spline curve and derive the basic function matrix for it. Also find the mid-point of a Hermite cubic spline with the two points as (1, 1) (6, 5) and tangent vectors as (0, 4) and (4, 0).

12. A tapering round bar is fixed at one end and a tensile load of 1000 N is applied at the other end as shown in fig. 2. Take elastic modulus, $E=2×10^5$MPa. Find the global stiffness matrix and displacements considering its as 4 elements.
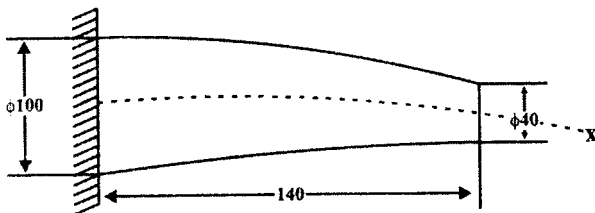

Fig. 2

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