Printed Pages - 4   NME-701/NPL-701

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

Paper ID : 2012333   Roll No. ☐☐☐☐☐☐☐☐

B. TECH.

Regular Theory Examination (Odd Sem-VII), 2016-17

COMPUTER AIDED DESIGN

Time : 3 Hours   *Max. Marks : 100*

Note: i) *All symbols have usual meaning.*

   ii) *Assume any relevent data, if missing.*

Section - A

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

    a) What are the limitations of CAD in design?

    b) What are the various display technologies used in
        CAD?

    c) What are the application areas of CAD?

    d) State the advantages of Bresenham line algorithm.

    e) What is concatenated transformation?

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f) What is PDES?

g) What is discretization in FEM?

h) What do you understand by analytic curves and synthetic curves?

i) States the different types of modeling in mechanical engineering field.

j) Give Euler's formula used in solid modeling.

Section - B

Note: **Attempt any 5 questions from this section.** **(5×10=50)**

2. State the various types of output devices used in CAD workstation. Explain, with neat sketch, any two output devices.

3. Prove the differential scaling and rotation are not commutative, but uniform scaling and rotation are commutative.

4. Determine the raster scan locations selected by Bresenham's algorithm while generating a line from $(1,0)$ to $(10,3)$.

5. A line is represented by end points P $(5,7.2)$ and Q $(-4,6.3)$. If 'U' at a point is 0 and 1 respectively, determine its length. Also determine the coordinates of points represented by $U = 0.4$, $U = 0.25$ and $U = 1.5$.

6. Generate a Bezier curve using the control points: $(2,0),(4,3),(5,2),(4,-2),(5,-3)$ and $(6,-2)$.

7. What are the various types of sweeps used in solid modeling? Explain with example.

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8. Using FEM methods calculate the deflection at the middle and end for the following cantilever beam. Take $A = 80$ sq.cm, $I = 300$ cm, $E = 2 \times 10^7 N/sq.cm$, Density $= 0.075 N/cm^2$.
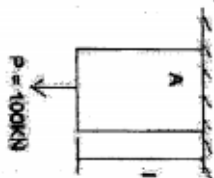
9. The 1-D element has a length of 200mm. The temperature at nodes 1 and 2 are 100°C and 40°C respectively. Evaluate the shape functions associated with nodes 1 and 2, if the temperature to be estimated at point P within the element, situated at 150mm from node 1. Also calculate temperature at point P.

Section - C

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

10. A thin steel plate has a uniform thickness $t = 1$ in, as shown in the fig. 2. Its elastic modulus, $E = 30 \times 10^6$ psi, and weight density, $r = 0.2836$ lb/in^3. The plate is subjected to a point load $P = 100$ lb at its midpoint and a traction force $T = 36$ lb/ft. Determine:

a) Displacement at the mid-point and at the free end,

b) Normal stresses in the plate, and

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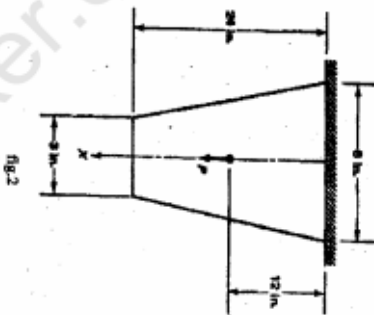
c)   Reaction force at the support.

fig-2

11.   Explain the B-Rep approach of solid modeling in detail. What is the importance of surface modeling in CAD application? State the advantages and limitations of wire-frame modeling.

12.   What are the essential elements of typical CAD/CAM software? A triangle PQR is having vertices P (10, 15), Q (40, 15) and R (30, 50). If the triangle is to be reflected about arbitrary line $y = 0.4x+2$, determine the concatenated transformation matrix and coordinates of new vertices of the triangle.

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