B.E. (Mechanical Engineering) Seventh Semester (C.B.S.)

Computer Aided Design

P. Pages : 3 **TKN/KS/16/7561**

Time : Three Hours Max. Marks : 80

* 0 9 0 6 *

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.
11. Use of Design data book is permitted.

1. a) Write Bresenham's line drawing algorithm for generation of line. **7**

b) Compare convensional design and CAD. Why CAD is beneficial? Discuss in details. **6**

OR

2. a) Explain working of raster refresh graphics display. Why frame buffer used? **6**

b) Write and explain Bresenham's ellipse drawing algorithm for the generation of ellipse. **7**

3. a) Find out the final position of line having end points (2, 2) and (10, 4). When it is translated by 5 units in Y – direction. Then scaled 2 units in X – direction and then rotated by 45º in clockwise direction about fixed point (2, 2). **7**

b) Show that the reflection of point about line Y = X is same as scaling followed by rotation about origin. **7**

OR

4. a) Determine the transformation matrix to take reflection of a point about line Y = 2x – 5. **7**

b) A cube of length 12 units is having one of its corner at the origin (0,0,0) and three edge along the three principal axes. If the cube is to be rotated about Z-axis by an angle 30º in the clockwise direction, calculate the new position of the cube. **7**

5. a) Determine the five points on the Bezier curve if $B_0[1, 1]$, $B_1[2, 3]$, $B_2[4, 3]$, $B_3[3, 1]$ the vertices of a Bezier polygon at $t = [\,0,\ 0.2,\ 0.4,\ 0.6,\ 0.8\,]$. **7**

b) Explain wire frame modeling along with its advantages and disadvantages. **6**

OR

6. a) Explain Bezier curve and write its basic properties. **6**

b) Explain the following : **7**

i) Importance of precedence diagram.

ii) Geometric modeling.

7. In fig. 1 a load of $P = 60 \times 10^3 N$ is applied as shown. Determine the displacement, stresses and support reaction in the body. Take $E \neq 20 \times 10^3 N/mm^2$. **13**

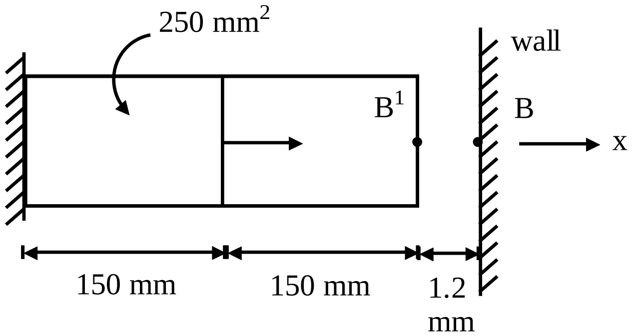

Fig. 1

OR

8. Determine the Nodal displacement at node 2, stresses in each element and support reactions in the bar shown in fig. (2), due to applied force $P = 500 \times 10^3 N$ and temperature rise of 75°C. **13**

Given :

$A_{AE} = 2400\,mm^2$ $\quad$ $A_{st} = 1300\,mm^2$

$L_{AL} = 250\,mm$ $\quad$ $L_{st} = 300\,mm$

$E_{AL} = 0.7 \times 10^5\, N/mm^2$ $\quad$ $E_{st} = 2 \times 10^5\, N/mm^2$

$\alpha_{AL} = 22 \times 10^{-6}$ per °C $\quad$ $\alpha_{st} = 12 \times 10^{-6}$ per °C

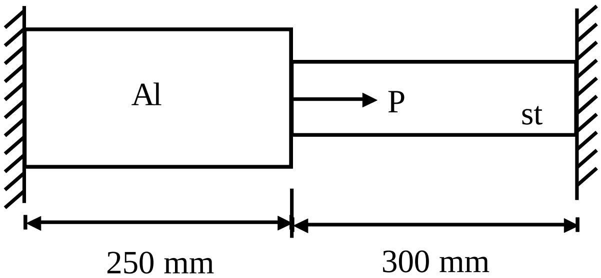

Fig. 2

9. A truss shown in fig. (3) with cross sectional area of all element is $400\,mm^2$ and $E = 200 \times 10^3\,N/mm^2$. Determine the displacement stresses and support reaction. **14**

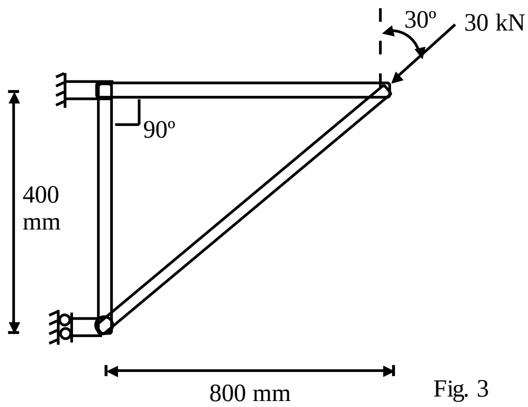

Fig. 3

OR

10 A two dimensional plate is loaded by a 20 KN force as shown in fig. (4). The thickness of plate is 12 mm and elastic modulus $E = 2 \times 10^5\,N/mm^2$ and Poisson ratio $\mu = 0.25$. Determine nodal displacement using plane stress condition. **14**

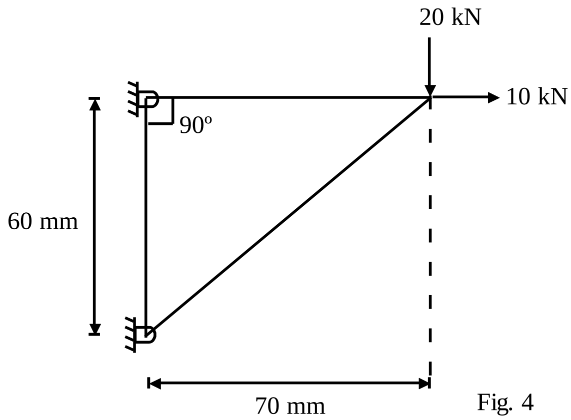

Fig. 4

11 a) A circular rod subjected with twisting moment 75 N-m. The length of shaft is 700 mm and factor of safety is 1.6. Design the shaft for minimum angle of twist, for the following material. **9**

i) SAE 1045 (oil quenched and drawn at 700ºC)
ii) SAE 3220
iii) SAE 2340 (Annealed)
iv) SAE 3120 (oil quenched)
v) Yellow Brass

b) Describe in detail the Adequate design and optimum design. **4**

OR

12. A tensile bar is subjected to the following conditions. Tensile load, F = 90 KN, Factor of safety = 1.6. length of bar = 500 mm. **13**
The diameter, $10\text{ mm} \leq d \leq 50\text{ mm}$
Design the bar for minimum weight for the following material.

i) SAE 1010 ii) SAE 1095
iii) Alluminium 260 iv) Yellow Brass
v) Phosphore Bronze

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