

Find deflection of each node, stress in each of the elements and reactions at support. Area of c/s for each bar is 200 mm^2 . Take $E = 200 \text{ Gpa}$. 13

9. For the two dimensional element shown in fig.Q.9, assemble Global Stiffness Matrix :

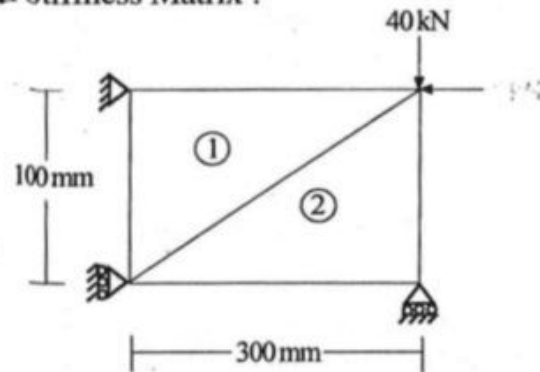


Fig. Q. 9

Take $E = 200 \text{ Gpa}$, thickness of plate = 20 mm and Poisson's ratio $\nu = 0.3$. 13

10. Write short notes on (any **THREE**) :

- Bisection Method
- Simplex Method
- Advantages of CAD
- Properties of Stiffness Matrix.

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Faculty of Engineering & Technology
Eighth Semester B.E. (Mech.)/
Sixth Semester B.E.P.T. (Mech.) Examination
COMPUTER AIDED DESIGN
Sections—A & B

Time—Three Hours] [Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

- All questions carry marks as indicated.
- Answer **THREE** questions from Section A and **THREE** questions from Section B.
- Due credit will be given to neatness and adequate dimensions.
- Assume suitable data wherever necessary.
- Use of non programmable calculator is permitted.

SECTION—A

- Explain the software system in CAD. 7
 - Explain the working of raster scan graphic terminal in detail. What is the role of Frame Buffers in it ? 6
- Consider two raster systems with resolutions of 800×600 and 1280×1024 . How many pixels could be accessed per second in each of these systems by display controller that has the refresh rate of 60 hz ? What is the access time per pixel in each case ? Also find time to scan a line. 5

- (b) Find the pixel positions that would be grown to plot a line $y = 3x + 5$ between (0, 5) and (3, 14). Plot the pixel on graph paper. 8

3. (a) A triangle shown in fig. Q. 3a is to be reflected about the line $y = -x + 10$. Find the transformation matrix and the new vertices of triangle. 8

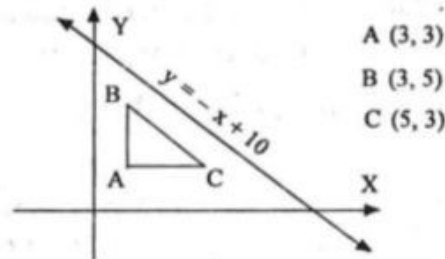


Fig. Q. 3a

- (b) A circle of radius 5 cm with centre at A(5, 8) is to be converted into ellipse with major axis $r_1 = 8$ cm and minor axis $r_2 = 5$ cm. Find the transformation matrix. 6
4. (a) What are Homogeneous Co-ordinates? Justify their need. 4
- (b) A cone with its base in X, Y plane and centre of base circle at (0, 0) has radius of 5 and axis along z axis of height 10 is rotated about a line A passing through L(0, 0, 0), A(20, 10, 10) by 45° clockwise. What are the co-ordinates of vertex of cone before and after transformation? Explain step by step concatenation of all transformation matrixes. 9
5. (a) What are Analytical and Synthetic Curves? Explain. 4
- (b) What are features of Bezier Curve? 4

- (c) Compare different Solid Modelling Techniques. 5

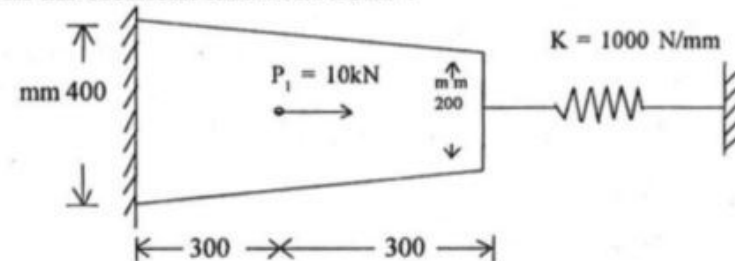
SECTION—B

6. (a) What is the significance of shape functions? Write and plot shape functions for quadratic shape function. 5
- (b) Derive the strain-displacement matrix B for linear bar element having the shape functions:

$$N_1 = \frac{1-r_1}{2} \text{ and } N_2 = \frac{1+r_1}{2}$$

Also explain the meaning of isoparametric elements. 8

7. For the component shown in fig. (7), treating as one dimensional element, determine nodal displacement, stresses in all element and reactions: 13



Est. = 200 Gpa

8. For the truss shown in figure Q. 8:

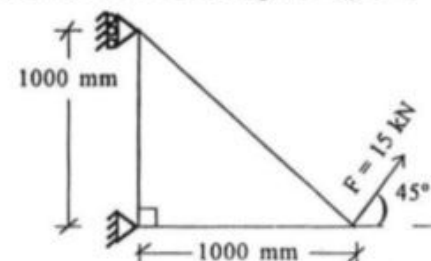


Fig. Q. 8