

Oct/BE/Insem.-15
B.E. (Mechanical) (Semester - I)
CAD/CAM & AUTOMATION
(2012 Pattern)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or 4, Q.5 or Q.6.*
- 2) *Figures to the right indicates full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of scientific calculators allowed.*

- Q1)** a) A triangle ABC has its vertices at A(40,0), B(0,0), C(0,40) is rotated about Point 'B' in 45° CW direction. Calculate concatenated transformation matrix and determine final position of triangle. [6]
- b) What homogeneous transformation? Write transformation matrix for translation. [4]

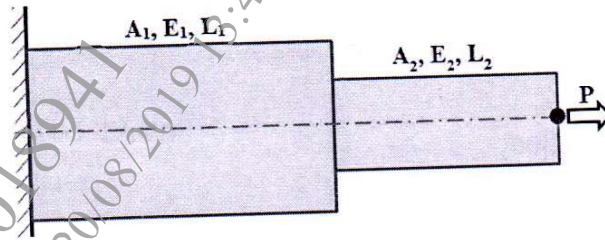
OR

- Q2)** a) A line PQ with P (0,0) and Q (5,15) is mirrored about line $X = Y$. Determine new coordinates of P and Q. [6]
- b) Write transformation matrix for following: i) Scale S_x & S_y in X & Y-direction resp., ii) Translation by u & v units in X & Y direction resp. [4]
- Q3)** a) Determine whether lines L_1 passing through $P_1(1,1)$, $P_2(7,7)$ and line L_2 passing through $P_3(5,2)$, $P_4(2,8)$ are intersecting or not. If yes, determine point of intersection. [6]
- b) Explain 'Bezier Curves' with neat sketch. [4]

OR

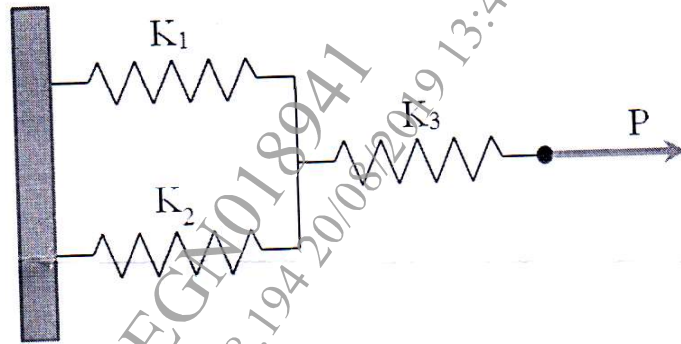
- Q4)** a) A circle is drawn with center point at C (0,0) and radius 8 units. Determine coordinates of four equispaced 4 points in the first quadrant. [6]
- b) Explain feature based modeling techniques with neat sketch. [4]

- Q5)** Determine nodal displacement, elemental stress and reaction at support for stepped bar shown in figure 1, if $P=50,000$ N, $A_1 = 300\text{mm}^2$, $A_2 = 200\text{mm}^2$, $L_1 = 250\text{mm}$, $L_2 = 200\text{mm}$ and assume $E_1 = E_2 = 2 \times 10^5 \text{N/mm}^2$. [10]



OR

- Q6) a)** For the Axially Loaded Spring System as shown in Figure 2, determine i) Nodal Displacements, ii) Deformation of each spring. Assume $K_1 = K_2 = K_3 = 100$ N/mm and $P = 1,000$ N [6]



- b) Explain 'Linear Shape function' in 1-D element. [4]

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