Total No. of Questions : 6] **SEAT No. :**

P5800 **[Total No. of Pages : 2**

B.E./Insem./Oct.-515
B.E. (Mechanical)
CAD/CAM & AUTOMATION
(2015 Pattern) (Semester - I)

Time : 1 Hour] ***[Max. Marks : 30***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of scientific calculator allowed.***

Q1) a) A Line **PQ** with $P(4, 6)$, and $Q(20, 30)$ is rotated by 30° CCW about point P. Derive concatenated transformation matrix and find new coordinates of points. **[6]**

b) Explain need of for mapping of geometric models. **[4]**

OR

Q2) Find the coordinates of triangle having vertex at $A(6,10)$, $B(6,25)$ and $C(16,25)$ when reflected along a line having **Y** intercept 4 and inclined at + 20° with X axis. Find concatenated matrix and transformed coordinates of triangle with graphical representation. **[10]**

Q3) a) A line drawn from point $P_1(12,3,9)$ and has length of 10 units. The unit direction vector is **0.2i – 0.8j + 0.566k**. Determine endpoint of line. **[4]**

b) Explain, in brief **[6]**

i) Geometry and Topology with suitable example,

ii) Coons Patch Surface.

OR

Q4) a) Determine the center point and radius of a circle passing through two diametrically opposite points $P_1(10,20)$ and $P_2(25,50)$. Determine parametric equation of circle and coordinates of four equispaced points in first quadrant. **[6]**

b) Explain B-spline Surfaces. [4]

P.T.O.

Q5) The stepped bar shown in **figure 1** is loaded axially by load $P = 50kN$, the modulus of elasticity of the bar is 0.7×10^5 N/mm^2. Determine nodal displacement, elemental stress and reaction at support. **[10]**

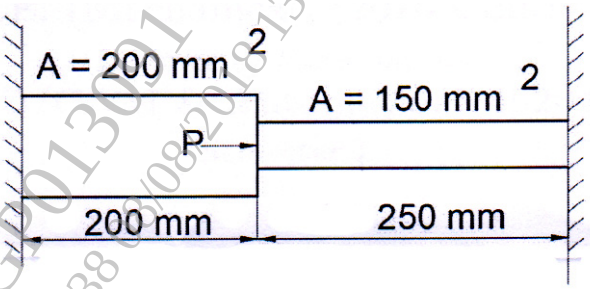

Figure 1 : Q.5

OR

Q6) a) For the Axially Loaded Spring System as shown in figure 2, determine (i) Nodal displacements, (ii) Deformation of each spring. **[6]**

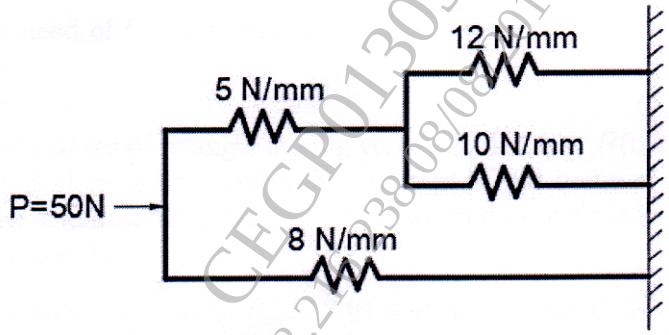

Figure 2 : Q 6(a)

b) Discuss Strain Displacement relations in FEA. **[4]**