

[5461]-522

**B.E. (Mechanical)**  
**CAD/CAM & AUTOMATION**  
**(2015 Pattern) (End Semester)**

Time : 2½ Hours]

[Max. Marks : 70

*Instructions to the candidates:*

- 1) Answer Q 1 or Q 2, Q 3 or Q 4, Q 5 or Q 6, Q 7 or Q 8, Q 9 or Q 10.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of scientific calculator allowed.
- 5) Assume suitable data if necessary.

**Q1)** a) Derive transformation Matrix for rotating any point at origin about Z-axis in X-Y Plane. Determine transformed coordinates of point P(4, 5) when rotated about Z-axis at origin by 30° in clockwise direction. [5]

b) What is Inverse Transformations. Discuss with suitable example. [5]

OR

**Q2)** a) Compare Bezier and B-Spline curves with neat sketch. [5]

b) Discuss  $p$  and  $h$  formulation for meshing with suitable example. [5]

**Q3)** a) Line  $L_1$  is passing through points  $P_1$  (1, 7) and  $P_2$  (7, 2). Determine parametric equation of a line and coordinates of five equispaced points on the line. [5]

b) Compare CSG and B-rep techniques in solid modeling. [5]

OR

**Q4)** For the step bar shown in figure 1, Find stress and deformation in elements, reaction at support using 1D elements, if temperature is increased by 40°C. Consider  $E = 210$  GPa,  $\alpha = 12 \times 10^{-6}$  per °C and  $P = 10$  kN. [10]

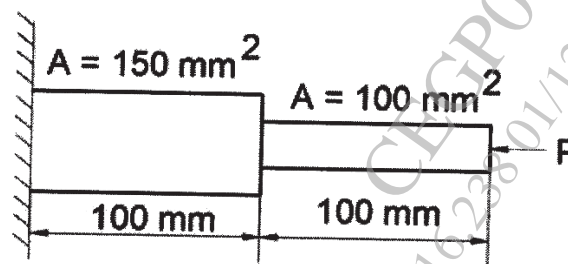


Figure 1:

P.T.O.

- Q5)** a) Write CNC program using G and M codes with suitable CANNED CYCLES to turn the mechanical component shown in figure 2 from bar stock of  $\phi$  38 mm. Assume suitable cutting data. [12]

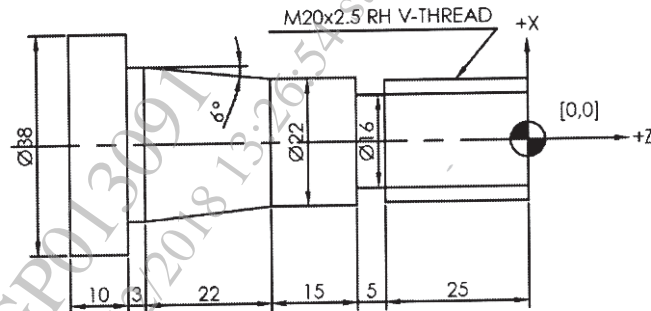


Figure 2:

- b) Discuss steps in CNC part programming. [6]

OR

- Q6)** a) Write CNC program using G and M codes to Face mill, contour the component, also drill holes for sketch shown in figure 3. Use subroutine wherever applicable. Thickness of blank is 25 mm. Assume suitable data for speed and feed. [12]

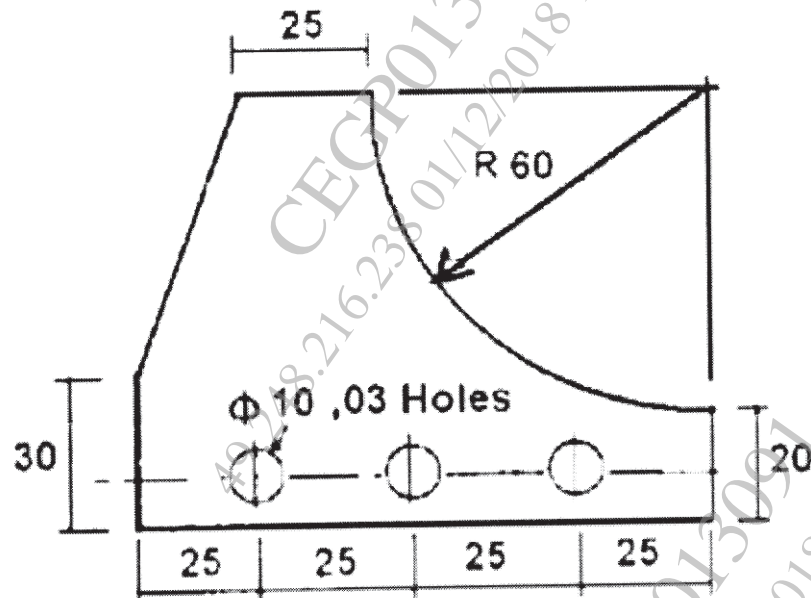


Figure 3:

- b) Explain canned cycles for following operations on horizontal machining center. [6]
- Threading
  - Parting

- Q7)** a) What is PLM? Discuss various components of PLM. [8]  
b) Explain Fused Deposition Modeling process with neat sketch and state its applications. [8]

OR

- Q8)** a) Explain Rapid Tooling and Rapid Prototyping [8]  
b) Discuss Collaborative Engineering. [8]

- Q9)** a) Discuss advantages of Computer Aided Process Planning. [8]  
b) List coding systems of Group Technology and explain any one in detail. [8]

OR

- Q10)** a) Discuss Hard and Soft Automation. [8]  
b) Explain robot anatomy with neat sketch. [8]

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