SEAT No. :

[Total No. of Pages :4

[4959] - 1032

B.E. (Mech.)

CAD - CAM AND AUTOMATION

(2012 Course) (End Sem.) (Semester - I)

Time : 2½ Hours] [Max. Marks :70

Instructions to the candidates:

   1)   *Answer in one answer books.*

   2)   *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*

   3)   *Neat diagrms must be drawn wherever necessary.*

   4)   *Figures to the right side indicate full marks.*

   5)   *Use of Calculator is allowed.*

   6)   *Assume suitable data, if necessary.*

Q1) a) A Line PQ has coordinates P (5, 5) and Q (5, 105). Find the new coordinates of line if line is transformed to make it horizontal, keeping point P intact. **[6]**

   b) Compare Hermit cubic spline, Bezier curve and B - Spline curve. **[6]**

OR

Q2) a) Write a short note on Constructive Solid Geometry (CSG) technique.**[4]**

   b) For the loading shown in fig. 1, find nodal displacements, elemental stresses and support reaction. **[8]**

Geometrical information: Cross section area = 225 mm^2 and Length = 300 mm.
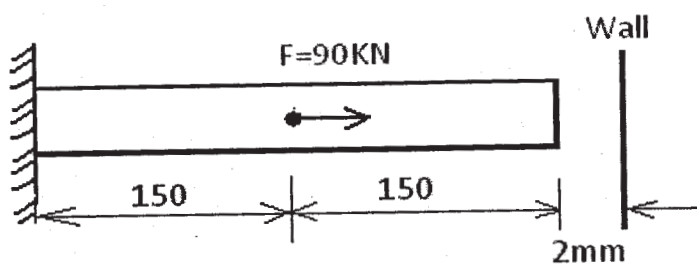
Material Properties: E = 80,000 N/mm^2.

Fig.1

Q3) a) Write a short note on Concatenated Transformation with examples. **[4]**

b) Derive a relation between Local coordinate and Global coordinate systems in FEM. **[4]**

OR

Q4) a) Compare Solid Modeling with Wire - frame Modeling. **[4]**

b) Explain Direct stiffness method to compute Element Stiffness Matrix of 1 - D element. **[4]**

Q5) a) Write a short notes with neat sketch on following: **[8]**

i) Direct Numerical Control (DNC) system.

ii) Tool radius and length compensation in milling.

b) Write a manual part program for milling and drilling the machine part as shown in fig.2, using G and M codes. Assume suitable data for speed, feeds

- *Thickness of plate is 20mm.Use **cuter radius compensation** for milling.*

- *Use **Peck - drill** cycle for drilling at (0, 0): Diameter 10 mm and Depth 15 mm.* **[10]**
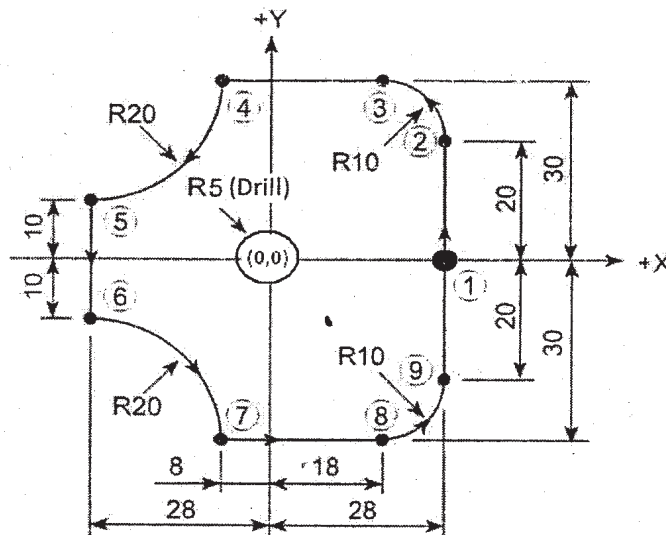

Fig.2 (All dimensions are in mm)

OR

Q6) a) Write a complete part program using G and M codes for the job shown in fig. 3. Assume suitable speed and feed for machining. **[12]**

- ***Billet size -*** *Diameter: 60 mm and Length: 90 mm.*

- ***Thread:*** *Major Diameter, D0 = 20 mm, Minor Diameter, Dc = 17 mm and Pitch: 2.5mm, Groove: Width = 5 mm and depth = 2.5 mm.*
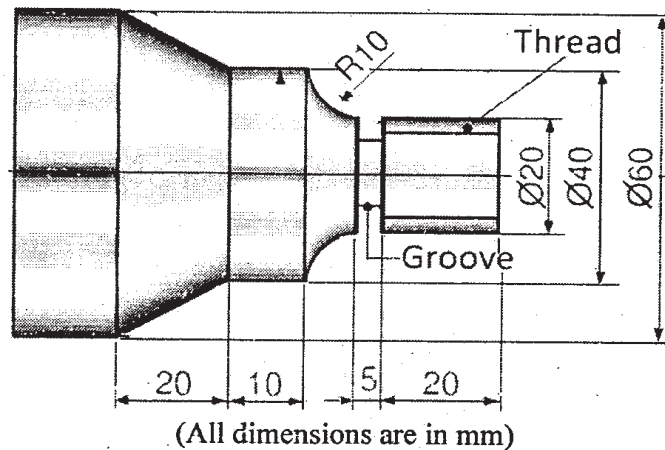

(All dimensions are in mm)
Fig.3

b) Explain with neat sketch: Machine Origin, Work Piece Origin and Program Origin. State importance of each. (*Origin may be treated as Reference*)**[6]**

Q7) a) Write steps in ***Laminated Object Manufacturing*** with neat Skectch. State its applications. **[8]**

b) Write steps in ***Selective Laser Sintering method*** with neat sketch. State its advantages. **[8]**

OR

Q8) a) Write steps in **S*tereo lithogrphy process*** with neat sketch. State its limitations. **[8]**

b) Explain different steps in **Rapid Prototyping** (RP) Systems. Also write a short note on Rapid Tooling. **[8]**

Q9) a) Define Industrial Robot. Explain 04 Parameters in robot selection. **[8]**

b) How does FMS ensure *Flexibility* in Manufacturing? Explain elements of FMS. **[8]**

OR

*Q10)*a) Explain the term "*Work Volume or Work Envelope*" of Robot. List various work volumes. **[8]**

Explain *Cylindrical Robot Work Envelope.*

b) What is Group Technology (GT)? Discuss machine cell design in GT? **[8]**

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