Total No. of Questions : 10]

SEAT No. : ☐

P3541

[Total No. of Pages : 4

[4959]-1226

B.E. (Automobile)

CAE & AUTOMATION

(2012 Pattern) (Elective - I) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:
1) *All questions are compulsory.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
5) *Assume suitable data if necessary.*

Q1) a) An ellipse is defined by the centre point (8, 12) and has a major radius of 10 and minor radius of 4. Determine the various points on the ellipse in the first quadrant, if the increment between each point is 30°. Assume that the ellipse is oriented such that the major axis and minor axis are parallel to X and Y axes respectively. **[6]**

b) Explain with the help of example concatenated transformation matrix.**[4]**

OR

Q2) a) With example, clearly define the term topology as used in modeling.**[4]**

b) A line had coordinates A(5, 4, 5) and B (8, 7, 9). The line is to be uniformly scaled by a factor 2 about point A. Determine the new coordinates of the line. **[6]**

Q3) a) Giving example, formulate a transformation for translating a given entity. **[4]**

P.T.O.

b) A 1D spar element having a linear shape function as shown in figure. If the temperature at node 1 is 50°C, and at node 2 is - 20°C, find the temperature at point P. **[6]**

OR

Q4) A stepped shaft is a shown in figure. Determine the stresses and deflections in each of the sections. Assume uniform material for the complete shaft having a modulus of elasticity as 200 GPa and the axial force F as 35KN. **[10]**

Q5) a)

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Write down the NC program for drilling three holes as shown in figure

i)   NC program without using canned cycles.

ii) NC program using canned cycles.   **[12]**

b) Describe with neat sketch Generative Approach to CAPP.   **[6]**
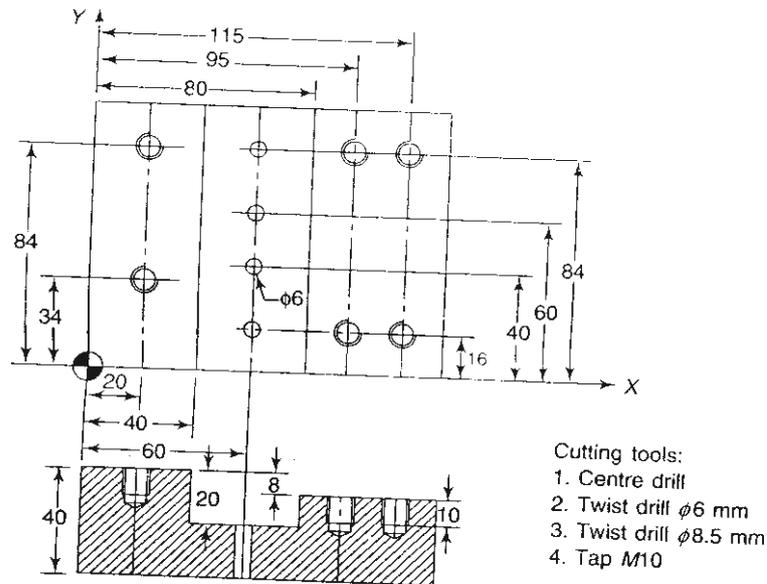
OR

Q6) a)

Figure shows the component to be machined. All the hole making operations are to be machined using the tools specified. In the above component the top surface is at three different levels and as such the clearance plane will be different for each of these planes. Write down the part program for machining the component completly (using appropriate canned cycle.).   **[12]**

b) Describe with neat sketch selective laser sintering process.   **[6]**

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Q7) a) What do you mean by Flexible Manufacturing Cell? Describe with neat sketch. State its applications. **[8]**

b) Following table shows the machines required for machining the respective parts.

Part	1	2	3	4	5	6	7	8	9
Machines Required	1, 4	2,3,5	1,4	1,4,6	2,3	2,3	7,8	1,4	7,8

Prepare the Part - Machine incidence matrix and group the parts with respect to machines required (using clustering method). **[8]**

OR

Q8) a) The various guiding principles used in AGV control are wire guided, infrared and Laser. Describe these three guiding principles. **[8]**

b) Describe with neat sketch Geneva Mechanism. State its application. **[8]**

Q9) a) What are the various types of motion control possible in robots? **[8]**

b) Describe with neat sketch the typical motions of the following types of Robots. **[8]**

i) Cartesian or Rectilinear Robot.

ii) Spherical Robot

OR

Q10) a) Describe the following methods of development of Robot Programs or teaching a robot, **[8]**

i) Lead by Noise

ii) Teach Pendant

ii) Off line Programming

b) The Robot system generally has four basic components : manipulator, controller, power source and the end effector . Describe these components in brief. **[8]**

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