Total No. of Questions : 12]

SEAT No. :

P2661

[Total No. of Pages :4

[5154]-31

B.E. (Mechanical)
CAD / CAM & AUTOMATION
(2008 Course) (Semester-I) (402041)

Time : 3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer Q.No.1 OR Q.No2 Q.No.3, OR QNo.4, and Q.No.5 OR Q.No.6 from seciton-I and Q.No.7 OR Q.No.8 Q.No.9 OR Q.No.10, Q.No.11 OR Q.No. 12 from section-II.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of electronic pocket non programmable calculator is allowed.***
6) ***Assume Suitable data, if necessary and mention it clearly.***

SECTION-I

Q1) a) Explain homogeneous transformation matrics to represent orthographic projections. **[4]**

b) A triangle has vertices A (2, 2) B(4, 4) and C(3, 5) Find the new coordinates of the triangle, It is. **[12]**

i) Mirrored about y = x,

ii) Scaled with respect to point A Using scale factor S_x=2 and S_y=1.5.

OR

Q2) a) Write Open GL syntax for the following commands. **[6]**

i) Rotation,

ii) Translation

iii) Scaling.

b) A rectangle is having vertices A (10, 10), B(40, 10) C(40,30) and D(10,30).

i) Mirrored about y=x,

ii) Rotate by 30° about point A. Write concatenated transformation matrix and find the new coordinates of the triangle. **[10]**

P.T.O.

Q3) a) Compare between B_rep and c_rep modeling techiques. **[8]**

b) A line joins two points $P_1(3,6)$ and $P_2(7,6)$. Write: **[8]**

i) Parametric equation of the line.

ii) Tangent Vector of the line, and.

iii) Unit vector in the direction of the line.

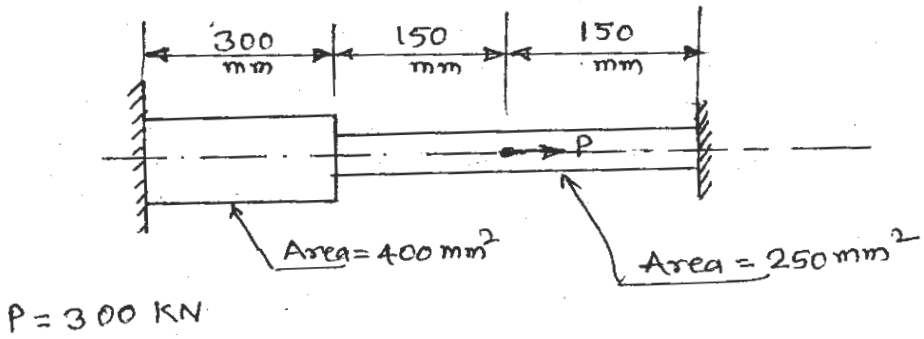
OR

Q4) a) Explain any three entities used for surface modeling. **[6]**

b) The coordinates of four data points P_0, P_1,P_2,P_3 are (2,2,0), (2,3,0), (3,3,0) and (3,2,0,) respectively. Find the equation of the Bezier curve and determine the coordinates points on curve for u= 0.0,0.25,0.5,0.75 and 1.0. **[10]**

Q5) a) Explain briefly, why meshing is required for analysis of engineering systems. **[4]**

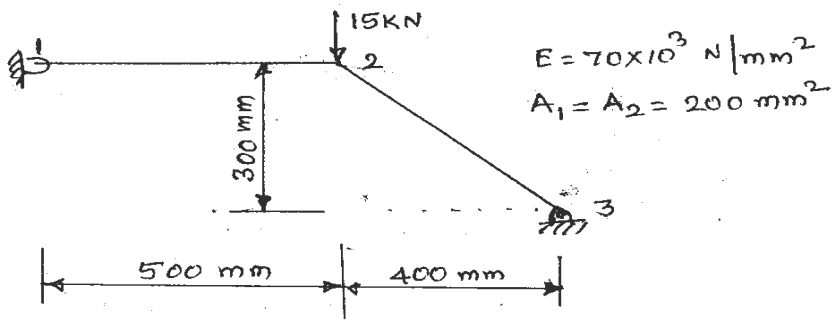
b) A stepped bar is subjected to an axial load of 300 kN, as shown in Fig. 1 using finite element method. Determine nodal displacements, stresses in each elements and reaction forces. Take $E=200\times10^3$ N/mm^2. **[14]**



OR

Q6) a) Derive the elemental stiffness matrix for 1 D bar element. **[6]**

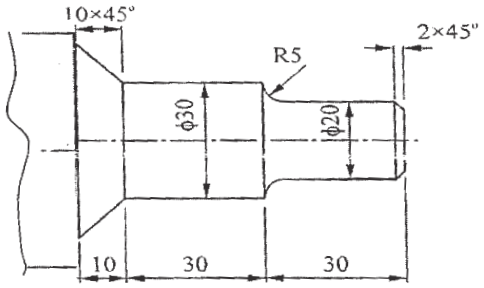
b) For the two - bar truss shown in Fig. 2, determine the displacement of node 2 and the stress in element 2-3. **[12]**



SECTION-II

Q7) a) Explain components of NC machine. **[6]**

b) Write a CNC part program to turn a MS bar of size and shape as shown in following figure. Use canned cycles only for both rough turning and finish cut. Assume feed rate (0.8mm/rev.) and spindle speed (1000 RPM). **[12]**



All dimensions are in mm

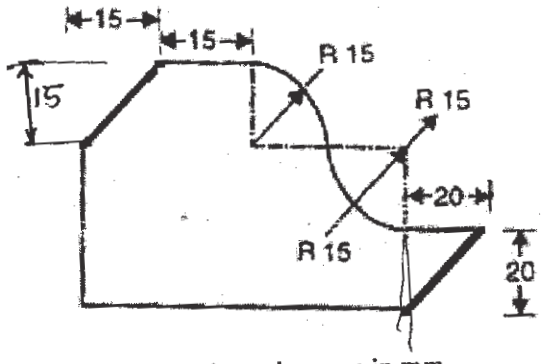
OR

Q8) a) Explain the meanings of following codes used in NC programming. **[6]**

i) G41,

ii) M14 and iii) T00.001

b) Write a CNC part program to machine the end profile for the component as shown in fig. 3, assume suitable data for feed and speed. Also use left cutter radius compensation and incremental programming mode. Take thickness of plate 100mm. **[12]**



All dimensions are in mm

Q9) a) Explain the general configuration and functions of DNC system. **[8]**

b) Explain Generative type of process planning. **[8]**

OR

Q10)a) Enlist part classification and coding systems used in group technology and explain any one in detail. **[10]**

b) What are the limitations and advantages of flexible automation. **[6]**

Q11)a) Explain different types of mechanical grippers. **[8]**

b) List different types of robot configurations and explain SCARA configuration in detail. **[8]**

OR

Q12)a) Explain the terms workspace, precision and accuracy related to the robotics. **[8]**

b) Compare between electric and pneumatic drives used in robots. **[8]**

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