Ganpat University

B. Tech SEM VIII Mechatronics Engineering

CBCS Regular Examination   April - June 2016

2ME704 Computer Aided Design

Duration: 3hr   **Marks: 70**

Instructions:

1. Write your answer to the point and precisely.
2. Draw neat and clean sketch.
3. Assume suitable data if it is required and state in your answer book clearly.

SECTION - 1

Q.1   **Answer the following Questions.**

(a) Explain mechanism of displacing graphics on display device.   [03]
(b) Derive the bresenham's decision variable equations for Circle.   [05]
(c) For end point of a line are (10, 20) and (20, 28). Find pixels by using DDA   [04]
      algorithm.

OR

Q.1   **Answer the following Questions.**

(a) What is scan conversion? What are the side effects of scan conversions?   [03]
(b) Write Digital Differential Algorithm for preparing line.   [05]
(c) Write C program for representing parabola.   [04]

Q.2   **Answer the following Questions.**

(a) Explain properties of Homogeneous coordinate in transformation matrix.   [03]
(b) Obtain composite transformation matrix for effecting a translation in the X,   [04]
      Y, Z direction by –l, -m,-n respectively and followed successfully by +θ
      rotation about X axis and +Φ rotation about y axis on the homogeneous
      coordinate position vector [x y z 1].
(c) For triangle ABC having co-ordinates A(4,4), B(7,4) and C(4,9). Determine   [04]
      new vertex position if it is reflected about a line Y = 5X + 3.

OR

Q.2   **Answer the following Questions.**

(a) How the order of multiplication affect the final result of 2D and 3D   [03]
      transformation? Explain with example.
(b) Derived composite transformation matrix for mirror about arbitrary line in   [04]
      plane.
(c) Derive equation of cubic spline in matrix form.   [04]

Q.3   **Answer the following Questions.(Any Three)**   [12]

(a) What are the reasons for the implementing a CAD System?
(b) Differentiate between parametric and non-parametric representation of
      curves.
(c) Explain properties of spline & Bezier curves.
(d) Briefly describe about solid modeling techniques and explain any one
   technique in detail.

SECTION II

Q.4   **Attempt all questions.**
   (a) What is shape function? Explain it briefly for 1D element and sketch them.   [05]
   (b) Derive the element stiffness matrix for bar element.   [07]

OR

Q.4   **Attempt all questions.**
   (a) Why shape function is selected as function of polynomial type? Explain and also give one example.   [05]
   (b) Derive the all element force vector for 1D element from work potential principle.   [07]

Q.5   **Attempt all questions.**
   (a) Write down the properties of global stiffness matrix.   [02]
   (b) How boundary treatment is applied in FEM? Explain elimination method.   [03]
   (c) Determine the node displacements in problem as shown in figure (5c).   [06]
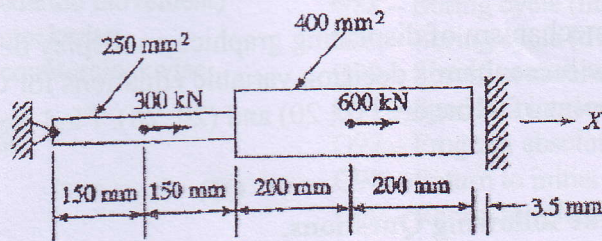
$$E = 200 \times 10^9 \ N/m^2$$

Figure (5c)

OR

Q.5   **Attempt all questions.**
   (a) What is importance of element connectivity table information?   [02]
   (b) Write a short note on penalty approach.   [03]
   (c) The torsional element shown in Figure OR(5c) has a solid circular cross section and behaves elastically. The nodal displacements are rotations θ_1 and θ_2 and the associated nodal loads are applied torques T_1 and T_2. Use the potential energy principle to derive the element stiffness.   [06]
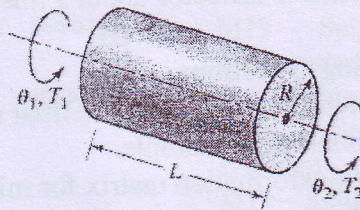

Figure OR(5c)

Q.6   **Attempt all questions.**   [12]
   (a) Write a short note on temperature load vector in truss problem.
   (b) How truss element is different from 1D bar element and briefly explain how element stiffness matrix are being created?

All the best