GANPAT UNIVERSITY

B.Tech. Sem. VIII Mechatronics Engineering CBCS
Regular Examination May-June 2017
2ME704 Computer Aided Design

Time: 3 Hrs **Marks: 70**

Instructions:

(i) All questions are compulsory.
(ii) This question paper has two sections. Attempt each section in separate answer book.
(iii) Assume suitable data if required but state them clearly in your answer-books.
(iv) Figure to the right indicates full marks.

SECTION – I

Q. 1 **Answer the following Questions.** **[12]**

(a) How geometric entities are scan converted? Draw a flow chart to scan converted DDA line.
(b) Give limitation of scan converted graphics in details.
(c) Write C program for scan converted ellipse by polynomial method.

OR

Q. 1 **Answer the following Questions.** **[12]**

(a) Write program for the Midpoint ellipse algorithm using C or C++ or MATLAB language.
(b) Explain how circle can be represented efficiently by use of parametric representation.
(c) End point of line are (8, 20) and (16, 25). Calculate pixels by using midpoint algorithm.

Q. 2 **Answer the following Questions.** **[12]**

(a) Lamina ABCD with an inner point P with coordinates (4,3), (3,1), (8,1), (7,4), (5,2) respectively is first rotated through 600 and then translated by (5,4). In another sequence, the lamina is first translated by (5, 4) and then rotated through 600. Find out the final positions and orientations of lamina for given the two sequences of transformations.
(b) Show that two-successive reflections about either of the coordinate axes is equivalent to a single rotation about the coordinate origin.
(c) Write MATLAB program for object rotated about one fixed point of object.

OR

Q. 2 **Answer the following Questions.** **[12]**

(a) What factors are to be considered for developing algorithm for graphics elements become efficient and user friendly?
(b) Describe the steps for the deriving composite transformation matrix for object reflects about arbitrary line L in space.
(c) Write MATLAB program for 2D Reflection transformation for any user defined coordinate of triangle about y =3x line.

Q. 3 **Answer the following Questions.**

(a) Derive decision variable equation of Bresanharms Circle algorithm. **[04]**
(b) The coordinates points & tangent of points relative to a current WCS are given A(3 3 0), B(3 4 0), A'(2 3 0), B'(4 5 0), find point on the cubic curve for u=0.25,0.5,0.75. **[04]**
(c) Which location pixel density is less in ellipse and circle in different methods? **[03]**

OR

(c) Derive equation for cubic curve segment and write condition for blending of segments. **[03]**

SECTION – II

Q. 4 **Answer the following Questions.** [12]

(a) Derive the stiffness matrix for one dimensional problem.

(b) With the load of P = 60 KN as shown in Figure 1, determine the displacement of node B' using penalty approach.

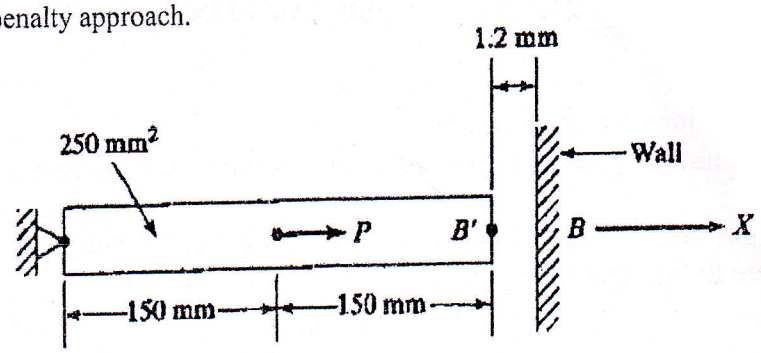


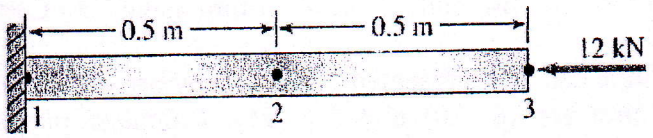
Figure 1

OR

Q. 4 **Answer the following Questions.** [12]

(a) Derive the local traction force vector for 1D bar element.

(b) A steel rod subjected to compression is modeled by two bar elements, as shown in Figure 2. Determine the nodal displacements and the axial stress in each element. What other concerns should be examined?



$E = 207$ GPa $A = 500$ mm^2

Figure 3

Q. 5 **Answer the following Questions.** [11]

The plane truss shown in Figure 3, is composed of members having a square 15 mm × 15 mm cross section and modulus of elasticity $E = 69$ GPa. (i) Assemble the global stiffness and force matrix. (ii) Obtain the displacement of node where loads are applied

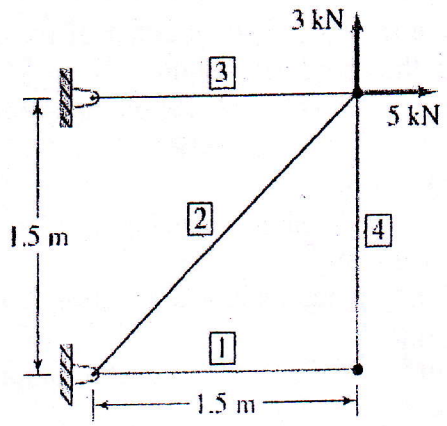


Figure 3

OR

Q. 5 **Answer the following Questions.** [11]

(a) Explain the elimination approach to handle the boundary condition in finite element method.

(b) How support reactions are calculated in elimination and penalty approach? Explain in detail.

Q. 6 **Answer the following Questions.** [12]

(a) Write the short note on CST (constant strain triangle).

(b) How temperature effect is considered in FEM problem? Explain in detail.

(c) Show the assembly process of global matrix by sample example.

End of Paper