

GANPAT UNIVERSITY
B.Tech. Sem. VIIth Mechanical & Mechatronics
Nov.- Dec. 2011 External Examination
MC-703/ ME-704 Computer Aided Design

Time: 3 Hrs

Marks: 70

Instructions:

- (i) All questions are compulsory.
- (ii) Answers to two sections must be written in separate answer books.
- (iii) Assume suitable data if required but state them clearly in your answer-books.
- (iv) Figure to the right indicates full marks.

SECTION – I

- Q1** Answer the following Questions. 12
- (a) What is Computer Aided Design? Explain phases of CAD.
 - (b) Explain principle of LCD display devices. Calculate memory requirement of 1024 X 768 resolution and 8 bit color.
 - (c) Write program for scan converted Ellipse.
- OR**
- Q1** Answer the following Questions. 12
- (a) Define i) Persistence ii) Resolution iii) Refresh rate iv) frame
 - (b) End point of line are (19, 10) and (28, 18). Find pixels by using DDA method.
 - (c) Write a Midpoint Algorithm for line having a slope more than 45° .
- Q2** Answer the following Questions. 12
- (a) Differentiate between geometric transformation and co-ordinate transformation.
 - (b) For rectangle ABCD having co-ordinates A(5,6), B(8,6), C(5,12) and D(8,12). Determine new vertex position if it is reflected about a line $Y = x + 2$.
 - (c) 'Final transformation' is effected by order of matrix multiplication of individual transformation' justify the statement with example.
- OR**
- Q2** Answer the following Questions. 12
- (a) Derive equation for Cubic curve and its properties.
 - (b) Explain Plane surfaces.
 - (c) The coordinates of four control points relative to a current WCS are given A(3 3 0), B(3 4 0), C(4 4 0), D(4 3 0), find the equation of resulting Bezier curve. Also find point on the curve for $u=0.25, 0.5, 0.75$.
- Q3** Write answers on following (Any three) 11
- (a) Write Program for Scan converted Bresenham's Circle.
 - (b) (i) Why homogenous coordinate is required in transformation? What are properties of homogenous coordinate?
(ii) What factors are to be considered for developing algorithm for graphics elements become efficient and user friendly?
 - (c) Derived composite transformation matrix for object rotate about any arbitrary axis in space.
 - (d) Discuss in brief "Boundary representation" technique of solid modeling.

SECTION - II

Q4 Answer the following Questions. 12

- (a) Explain steps for Finite Element Analysis with example.
- (b) The bar shown in fig.1 An axial load $P = 200 \times 10^3 \text{ N}$ is applied as shown. Using the penalty approach for handling boundary conditions. Determine the nodal displacements, stress, and reaction forces.

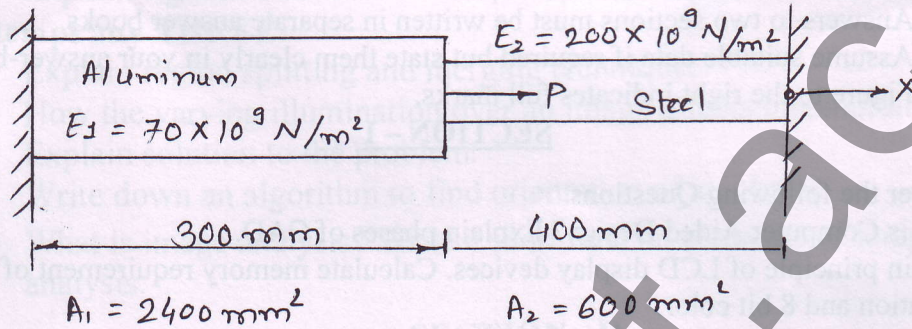


Fig. 1 Que. 4 (b)

OR

Q4 Answer the following Questions. 12

- (a) Write applications of Finite Element Analysis.
- (b) Determine the displacements of nodes of the spring system shown in fig.2

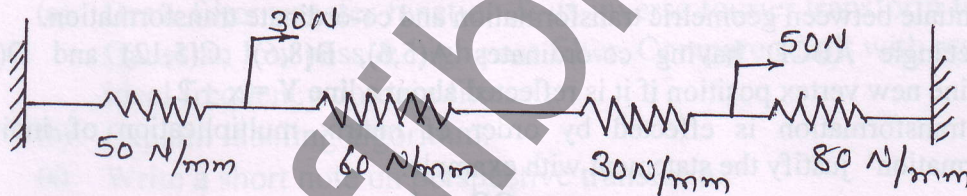


Fig. 2 Que. 4 (b) OR

Q5 Answer the following Questions. 12

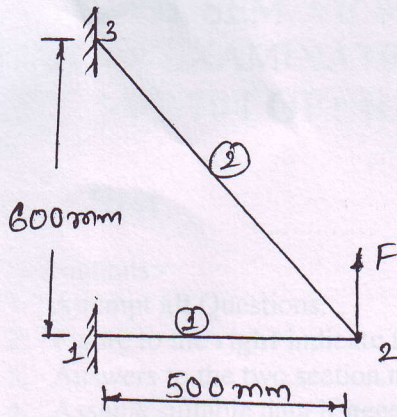
- (a) Explain Minimum Potential Energy principal for FEA.
- (b) A tapered bar having circular section 150 mm^2 and 60 mm^2 respectively for big end and small end. Big end is fixed while small end is having a point load of 60 kN. And length of tapered bar is 300mm. plot the deflection in the bare at 100mm and 200mm respectively from the fixed end for each of the cases, assume modulus of elasticity as 200 GPa.

OR

Q5 Answer the following Questions. 12

- (a) What is Shape Function? Write its properties.

- (b) For the truss shown in fig. 3, determine the nodal displacements and the stresses in all bars.



$$A_1 = 200 \text{ mm}^2$$

$$A_2 = 300 \text{ mm}^2$$

$$F = 95 \text{ kN}$$

$$E_1 = E_2 = 2.1 \times 10^5 \text{ N/mm}^2$$

Fig. 3 Que. 5 (b) OR

Q6 Answer the following Questions (Any Three)

- What is Element in Finite Element Analysis? How quality of meshing is check in FEA.
- Compare Classical methods, FEA, and FDM.
- Write Criteria for selection of FEA software.
- Explain Constant Strain Triangle for Two dimensional element.

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