

GANPAT UNIVERSITY
CBCS Regular Examination Nov-Dec 2015
B.TECH VII SEM Mechanical Engineering
2ME704 COMPUTER AIDED DESIGN

Instructions:

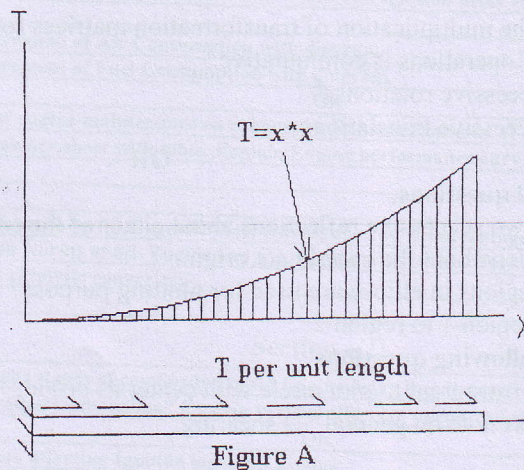
1. Attempt all questions.
2. Figure to right indicate full marks of questions.
3. Assume reasonable and suitable Engineering data.

Duration: 3 hr**[Total Marks: 70]****SECTION I****1. Answer the following questions****[12]****(a) Describe the following :**

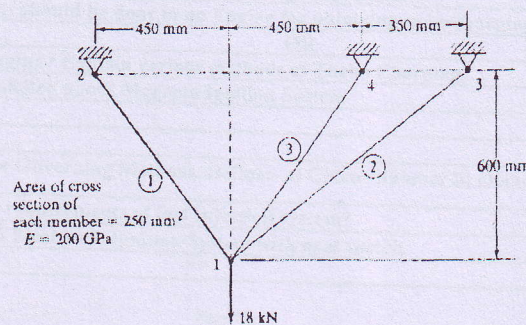
1. Degree of freedom in element
2. Fine and coarse mesh and its effect on result
3. Effect of global system matrix size on FEM process

(b) Write down importance of nodal connectivity information and explain by one example.**OR****1. Answer the following questions****[12]**

Determine the stresses in 4 cm long bar in figure A using one linear element model.
 $A = 20 \text{ cm}^2$ and $E = 2.1 \text{E}05 \text{ N/mm}^2$

**2. Answer the following questions****[11]**

Using elimination approach, determine the displacement of node 1 as shown in figure 2.



OR

2. Answer the following questions

[11]

- (a) How the element is selected for particular application? Explain briefly.
- (b) From the concept of potential energy approach, derive element stiffness matrix for bar and 2D truss element with required diagrams.

3. Write a short note on following.

[12]

- (a) Derive element force vector for truss element.
- (b) How thermal load vector is considered in FEM problem? Explain.

SECTION II

4. Attempt all questions.

[12]

- (a) Use mid-point algorithm to derive decision parameter for straight line.
- (b) Calculate pixel position using DDA method from point (10, 20) to (20, 30).

OR

4. Attempt all questions.

[12]

- (a) What is decision parameter? Explain importance of it in deriving circle mid-point algorithm.
- (b) Determine the form of the transformation matrix for a reflection about an arbitrary line with equation $y = m + b$.

5. Attempt all questions.

[11]

- (a) What is geometrical transformation? Derive 2D and 3D transformation for rotation matrix.
- (b) Prove that the multiplication of transformation matrices (or each of the following sequence of operations is commutative:
 - (a) Two successive rotations.
 - (b) Two successive translations.

OR

5. Attempt all questions.

[11]

- (a) Show that two successive reflections about either of the coordinate axes is equivalent to a single rotation about the coordinate origin.
- (b) Why two regions in ellipse are used for plotting purpose? Derive the condition to switch over from region 1 to region 2.

6. Attempt following questions

[12]

- (a) Write a C++ program to plot circle with center as origin.
- (b) Write a short note on general 3D shearing.

ALL THE BEST