

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI (NEW) EXAMINATION – WINTER 2017

Subject Code: 2161903

Date: 20/11/2017

Subject Name: Computer Aided Design

Time: 02:30 PM TO 05:00PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1**
- (a) Differentiate between Raster scan and vector scan displays **03**
 - (b) Discuss application of FEA. **04**
 - (c) State the various CAD software commercially available and explain the features used to model Hexagonal nut. **07**

- Q.2**
- (a) List out various graphics standards and explain IGES. **03**
 - (b) Explain the various steps required to solve mechanical problem using finite element analysis. **04**
 - (c) Using DDA algorithm, find the Pixel value position of line between points (2,10) and (6,5) **07**

OR

- (c) Explain Bresenham's algorithm for generation of line with flow chart. **07**
- Q.3**
- (a) Show with figure the number of nodes required in 1D, 2D and 3D elements **03**
 - (b) Explain B-spline curve with figure. **04**
 - (c) Plot the Bézier curves having control points, $P_0(2, 2)$, $P_1(2, 3)$, $P_2(3, 3)$ and $P_3(3, 2)$. Plot for values $u = 0, 0.25, 0.5, 0.75, 1.0$, if the characteristic polygon is drawn in sequence $P_0 - P_1 - P_2 - P_3$ **07**

OR

- Q.3**
- (a) What is Coons Patch? **03**
 - (b) Differentiate Solid modelling and wire frame modelling. **04**
 - (c) Line passing through the end points $P_1(2, 7, 3)$ and $P_2(6.26, -9.78, 13)$ in the direction given by the unit vector $0.213i - 0.839j + 0.5k$. Find the coordinate of the mid-point of the line. **07**
- Q.4**
- (a) Write 2D transformation matrix for Scaling, Rotation and Translation. **03**
 - (b) Write short note on Constructive Solid Geometry (CSG) **04**
 - (c) Triangle ABC has its vertices at A (0, 0), B (0, 4) and C (3, 2). Zoom this triangle 3 times and then hang it considering a free body using hook at point C with origin. **07**

OR

- Q.4**
- (a) What do you mean by degree of freedom? Write the degree of freedom for structural, Heat transfer, fluid flow and magnetic applications **03**

- (b)

A 90 m long 1D element is having linear shape function if the temperature at node 1 is -50°C and at node 2 is 70°C , find the temperature at a point 25 m away from node 1

04
- (c)

A triangle ABC, having coordinate position of point A (15, 15) B (18, 12) and C (15, 20). Determine the new vertex position if the triangle is :
1. Scaled 0.5 times in X and 2 times in Y direction
2. If mirrored about a line $y = 4x + 12$.

07
- Q.5

(a)

Find the Jacobian matrices for triangle shown in Fig.1

03
- (b)

Explain the penalty approach used in FEA

04
- (c)

Modeled the tapered bar shown in figure 2 by considering it is made of 2 elements and determine deflection at both end and in middle of the bar. Assume modulus of elasticity as 200 GPa.

07
- OR
- Q.5

(a)

Derive the global stiffness matrix for the system of spring shown in fig 3

03
- (b)

Explain penalty approach used to solve FEA problem

04
- (c)

For the loading system as shown in figure 4, find out displacement, stress and support reaction. Assume modulus of elasticity $80 \times 10^3 \text{ N/mm}^2$.

07

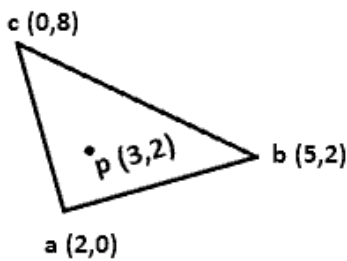


Fig 1

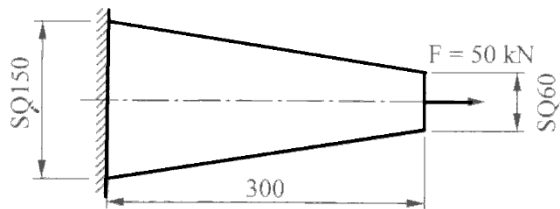


Fig 2

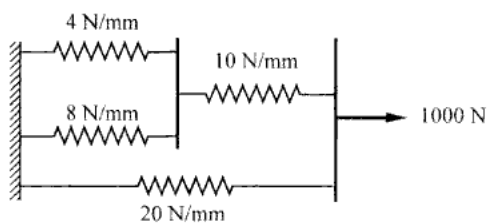


Fig 3

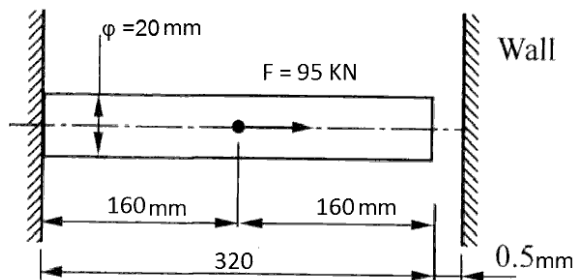


Fig 4
