SHANTILAL SHAH ENGINEERING COLLEGE-BHAVNAGAR
MECHANICAL ENGINEERING DEPARTMENT
QUESTION BANK

SUBJECT CODE: 2161903
SUBJECT: Computer Aided Design
Enrollment No: _____ Batch:_____

Sr. No.	Detail	GTU Year	Marks
1. Introduction			
1.	Differentiate between Raster scan and vector scan displays	Winter-2017	03
2.	State the various CAD software commercially available and explain the features used to model Hexagonal nut.	Winter-2017	07
3.	List out various graphics standards and explain IGES.	Winter-2017	03
4.	Using DDA algorithm, find the Pixel value position of line between points (2,10) and (6,5).	Winter-2017	07
5.	Explain Bresenham's algorithm for generation of line with flow chart.	Winter-2017	07
6.	State the various stages for a design process, in which various CAD tools can be used to improve productivity.	Summer-2017	03
7.	Write steps required to plot a line whose slope is between 45º & 90º, using Bresenham's algorithm.	Summer-2017	07
8.	What is graphic standard? Explain different CAD standards.	Winter -2016	07
9.	Determine following for an 8-plane raster display with resolution of 1280 x 1024 and a refresh rate of 60Hz (non-interlaced): i. The size of graphical memory (refresh buffer memory). ii. The time required to display a scan line & a pixel. iii. The active display area of the screen if the resolution is 78 dpi (dots per inch)	Winter -2016	07
10.	For a circle having radius 8, plot the pixels by Breshnham's algorithm in first quadrant from x = 0 to x = r $\sqrt{2}$	Summer-2015	07
11.	Discuss different analysis carried out by CAD analysis software.	Summer-2015	07
2. Curves and surfaces			
1.	Explain B-spline curve with figure	Winter-2017	04
2.	Plot the Bêzier curves having control points, P0 (2, 2), P1 (2, 3), P2 (3, 3) and P3 (3, 2). Plot for values u = 0, 0.25, 0.5, 0.75, 1.0, if the characteristic polygon is drawn in sequence P0 - P1 - P2 - P3.	Winter-2017	07
3.	What is Coons Patch?	Winter-2017	03
4.	Line passing through the end points P1 (2, 7, 3) and P2 (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	Winter-2017	07

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5.	For the position vectors P1 [3 7] and P2 [8 9], determine the parametric representation of line segment between them. Also determine the slope	Summer-2017	04
6.	State the properties of Hermite Cubic Splines. How these curves are differing from Bezier curves?	Summer-2017	04
7.	Two Bezier curve sections A and B have order of 3 and 4 respectively. Derive the condition for 1st order (C1) continuity between these two sections.	Winter-2016	07
8.	With the help of neat sketches explain various types of surfaces.	Winter-2016	07
3. Mathematical representation of solids			
1.	Differentiate Solid modelling and wire frame modelling	Winter-2017	04
2.	Write short note on Constructive Solid Geometry (CSG)	Winter-2017	04
3.	Differentiate between surface and solid modelling. State the limitations and applications of each of these modelling techniques.	Summer-2017	07
4.	Derive the orthographic projection matrices for the Top view and Right Hand side view of a 3D model.	Summer-2017	03
5.	What do you mean by Iso-parametric representations?	Summer-2017	03
6.	What do you understand by 2 ½ D model? Clearly distinguish it from 3-D model.	Summer-2016	07
4. Geometric Transformations			
1.	Write 2D transformation matrix for Scaling, Rotation and Translation.	Winter-2017	03
2.	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.	Winter-2017	07
3.	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.	Winter-2017	07
4.	A point P is translated by (4, 6, and 0) rotated about x-axis by 45º CCW and then rotated about z- axis by 30º CCW. Obtain the concatenated homogeneous transformation matrix and final coordinates of a point P.	Summer-2017	07
5.	Find reflection matrix, when the axis of reflection is given by the equation y=5x.		
5. Finite element analysis			
1.	Discuss application of FEA.	Winter-2017	04
2.	Explain the various steps required to solve mechanical problem using finite element analysis	Winter-2017	04
3.	Show with figure the number of nodes required in 1D, 2D and 3D elements	Winter-2017	03

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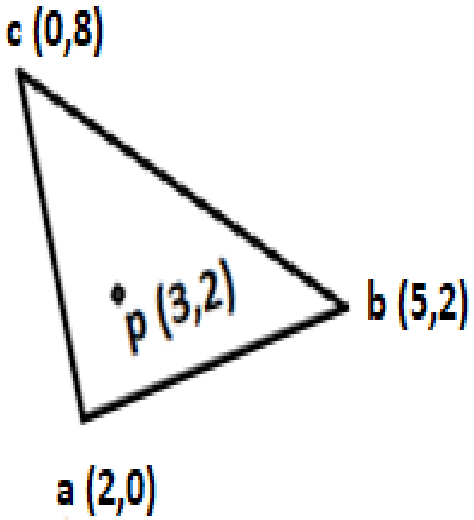
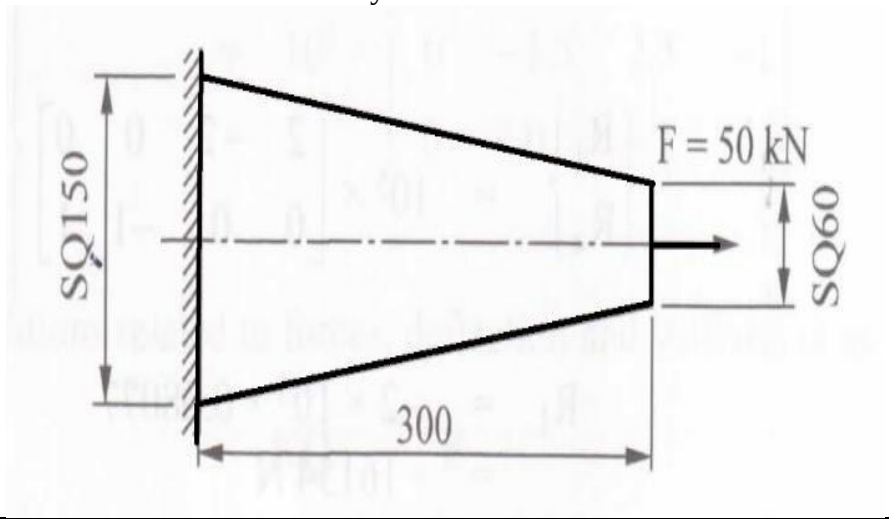
4.	What do you mean by degree of freedom? Write the degree of freedom for structural, Heat transfer, fluid flow and magnetic applications	Winter-2017	03
5.	A 90 m long 1D element is having linear shape function if the temperature at node 1 is -500 C and at node 2 is 700 C, find the temperature at a point 25 m away from node 1.	Winter-2017	04
6.	Find the Jacobian matrices for triangle shown in Fig. 	Winter-2017	03
7.	Explain the penalty approach used in FEA	Winter-2017	04
8.	Model the tapered bar shown in figure 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. 	Winter-2017	07
9.	Derive the global stiffness matrix for the system of spring shown in fig	Winter-2017	03

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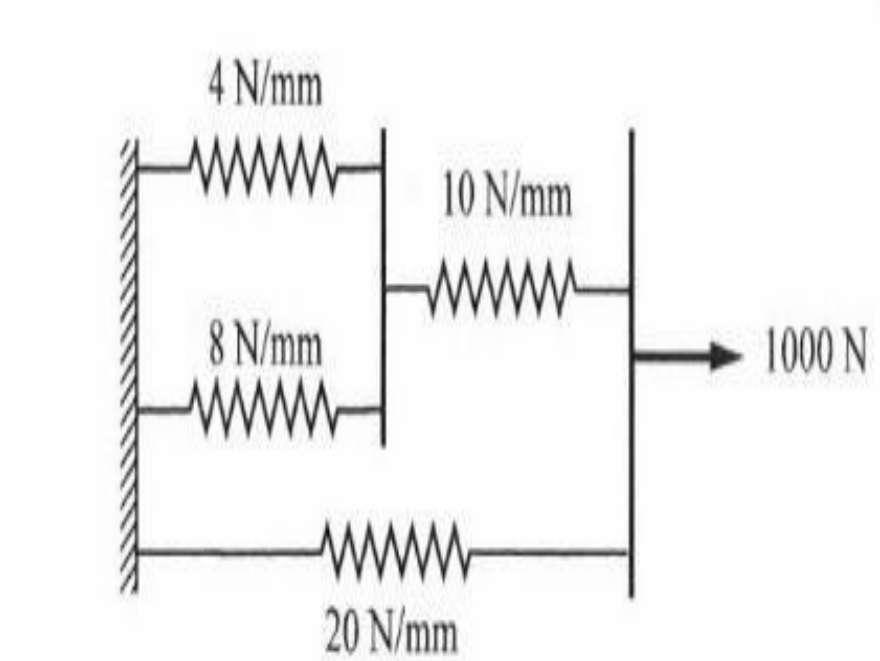
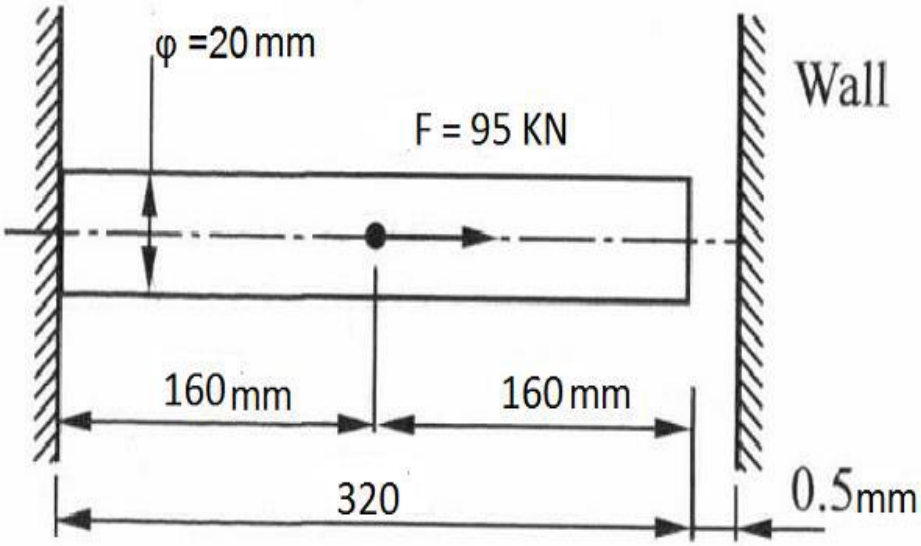
			
10.	For the loading system as shown in figure, find out displacement, stress and support reaction. Assume modulus of elasticity 80 x 103 N/mm2. 	Winter-2017	07
11.	Draw a sketch of following elements showing nodes: (1) Quadrilateral (2) Six noded triangular (3) Tetrahedral	Summer-2017	03

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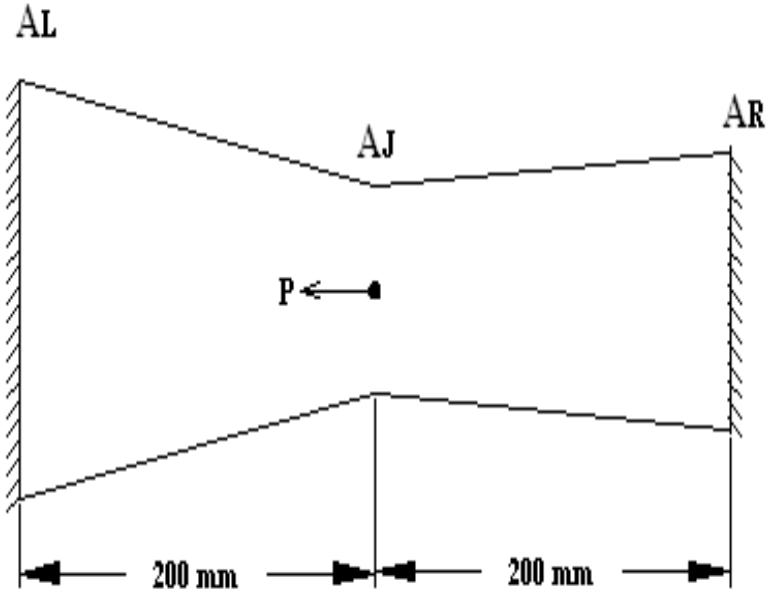
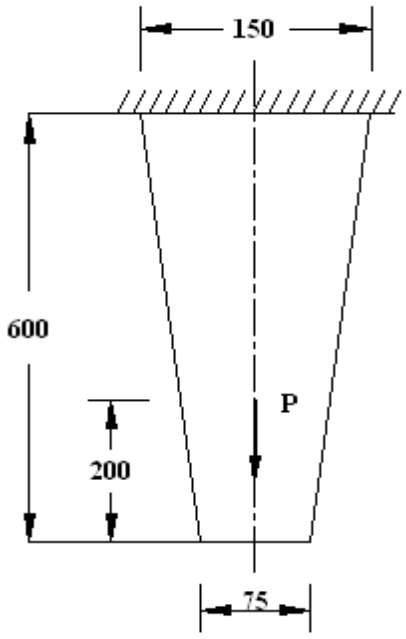
12.	Formulate the finite element model using 1D-bar element for the system shown in figure-2 below. Area at the junction shown below is AJ =250 mm2, at the left end is equal to AL=750 mm2 and at the right end is equal to AR=500 mm2. Length up to junction from any end is 200 mm. Load P=500kN is acting at the junction. Young's modulus of elasticity E= 200 Gpa. The temperature of the system is raised by 40°C. Co-efficient of thermal expansion is 11×10-6 per °C. Assemble the stiffness matrix & force vector. 	Summer-2017	07
13.	A thin plate as shown in figure-4 has a uniform thickness of 10 mm and modulus of elasticity is 200 Gpa. The plate is subjected to a point load P = 500 N as shown in figure. Model the problem with two elements and find stresses in each element. 	Summer-2017	07

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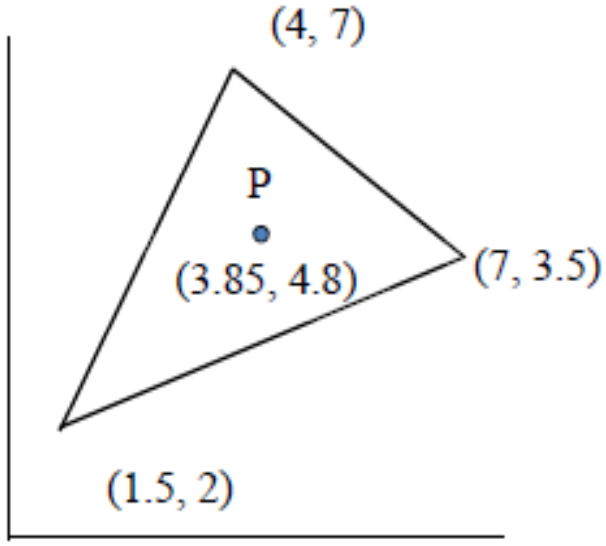
14.	Discuss quadratic shape functions and their uses.	Summer-2017	03
15.	i. State the applications of FEA in the field of engineering. ii. Write the properties of global stiffness matrix.	Summer-2017	04
16.	Write the general steps to be followed in FEA to solve a structural problem.	Summer-2017	07
17.	Evaluate the shape functions N1, N2 and N3 at the interior point P for the triangular element as shown in figure  	Summer-2017	07
18.	i. List properties of global stiffness matrix [K]. ii. Write element stiffness matrix and element load vectors for a beam element.	Winter-2016	07
19.	Explain Penalty approach and Elimination approach for FEA.	Summer-2016	07
20.	What is shape function? Derive linear shape functions for 1-dimensional bar element in terms of natural coordinate. Also plot variation of shape functions within this element.	Winter-2016	07

SHORT QUESTIONS

Sr. No.	Detail	GTU Year
1.	DVST stands for _____ a. Digital View Storing Table b. Direct Visual Storage Tube c. Direct View Storage Tube d. Digital View Storage Tube	Summer 2017
2	A _____ modeler defines model without mass properties. a. wireframe b. primitive c. B-rep d. CSG	Summer 2017
3	What is persistence?	Summer 2017
4	A triangle has vertices at *A* (2, 3), *B* (4, 3), and *C* (3, 6). Which transformation would produce an image with vertices *A'* (3, - 2), *B*' (3, - 4), *C*' (6, - 3)? a. a reflection over the *x*-axis b. a reflection over the *y*-axis c. a rotation 90° clockwise at origin d. a rotation 90° counterclockwise at	Summer 2017
5	B-rep and C-rep are the methods of a. Solid modeling b. Surface modeling c. Wire frame modeling d. 2D modeling	Summer 2017
6	The degree of Bezier curve with n control points is: a. (n+1) b. (n-1) c. (n+2) d. (n-2)	Summer 2017
7	C1 continuity refers to a. Common tangent b. Common curvature c. Common normal d. Common point	Summer 2017
8	The rectangle portion of the interface window that defines where the image will actually appear are called a) Transformation viewing b) View port c) Clipping window d) Screen coordinate system	Summer 2017
9	State limitations of wire-frame modeling	Summer 2017
10	State any two advantages of homogeneous coordinate transformations.	Summer 2017
11	Write two characteristics of any shape functions.	Summer 2017
12	What is a difference between bar elements and beam elements?	Summer 2017
13	What are the types of loading acting on structure?	Summer 2017
14	Name any three FEM software.	Summer 2017