

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2023****Subject Code:2161903****Date:14-07-2023****Subject Name:Computer Aided Design****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed

		MARKS
Q.1	(a) State the various stages for a design process, in which various CAD tools can be used to improve productivity.	03
	(b) What is graphic standard? Explain different CAD standards.	04
	(c) Explain DDA algorithm for line generation with its limitations	07
Q.2	(a) With the help of neat sketches explain various types of surfaces.	03
	(b) Explain difference between analytic curves and synthetic curves with example.	04
	(c) Derive general parametric equation for Hermits cubic spline curve in matrix form.	07
	OR	
	(c) Explain with example the following surfaces 1. Plane surface 2. Bezier surface 3. B-spline surface	07
Q.3	(a) Explain same geometry but different topology for solid modeling.	03
	(b) Explain constructive solid geometry (CSG).	04
	(c) Discuss steps involved in feature based modeling. List most commonly used feature operations in CAD systems	07
	OR	
Q.3	(a) Enlist the various methods of geometric modeling. Discuss wire frame modeling.	03
	(b) Explain CSG and B-rep techniques of solid modeling.	04
	(c) Describe surface and solid modelling and state the limitations and applications of each of these modelling techniques.	07
Q.4	(a) Explain the concept of homogeneous coordinates and its use in representing geometrical transformation.	03
	(b) Explain two dimensional geometric transformations in details. Also give transformation matrix for each.	04
	(c) Explain 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.	07
	OR	
Q.4	(a) Write 2D transformation matrix for Scaling, Rotation and Translation.	03
	(b) Find reflection matrix, when the axis of reflection is given by the equation $y=5x$.	04
	(c) Explain different types of elements used in FEA? Explain in brief.	07
Q.5	(a) Explain in details : The general procedure of Finite Element Method and List various engineering application of FEA.	03

- (b) Explain Penalty approach and Elimination approach for FEA. 04
 (c) Consider the bar shown in figure-1. An axial load $F=35$ kN is applied as shown. Using penalty approach for handling boundary conditions, determine nodal displacements. Take $E=200$ Gpa. For all elements. Length of each element is in mm. 07

OR

- Q.5 (a) With the help of suitable examples explain condition of plane stress and plane strain. 03
 (b) Calculate the shape functions N_1 , N_2 and N_3 at the interior point P for the triangular element as shown in figure 2. 04
 (c) A thin plate as shown in figure-3 has a uniform thickness of 20 mm and modulus of elasticity is 200×10^3 N/mm². The plate is subjected to a point load $P = 500$ N as shown in figure. Model the problem with two elements and find global stiffness matrix. 07

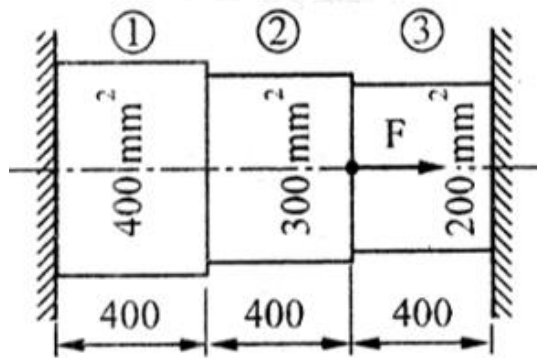


Figure 1

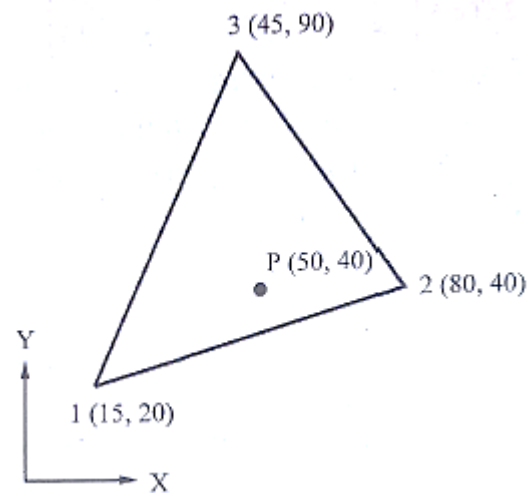


Figure 2

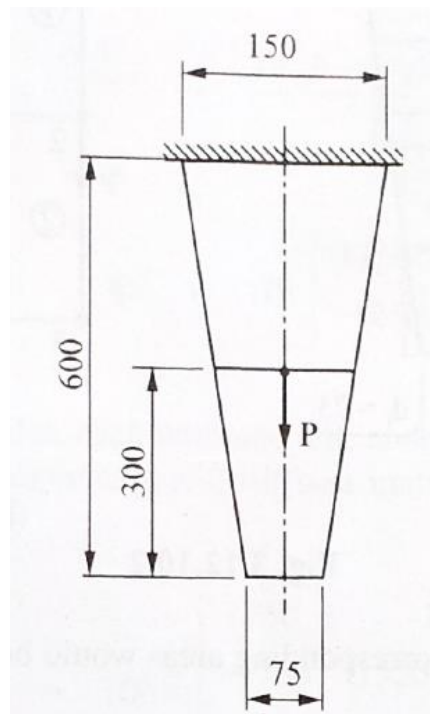


Figure 3
