

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER- VI EXAMINATION – SUMMER 2026****Subject Code:3161903****Date:22-05-2026****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) Discuss reasons for implementing CAD in industry.	03
	(b) Compare Computer Aided Design with Conventional Design Process.	04
	(c) Explain the concept of Finite Element Method. Discuss about various steps involved in Finite Element Analysis.	07
Q.2	(a) List the advantages and limitations of surface modeling.	03
	(b) Differentiate between parametric and synthetic curves. Explain various types of continuity used in synthetic curves.	04
	(c) The end points of a line are (2, 3) and (10, 8). Find the intermediate raster locations of the line using DDA algorithm.	07
	OR	
	(c) A line is required to draw from (25,25) pixel to (62,44) pixel. Calculate first six positions for the same using Bresenham's algorithm.	07
Q.3	(a) What is Geometric Transformation?	03
	(b) Explain types of projections of geometric models with neat diagram.	04
	(c) A rectangle ABCD having vertices A (50, 100), B (200,100), C (200,200) and D (50,200) is to be reflected about a line passing through points P (20, 20) and Q (110, 130). Determine the new vertices of the rectangle.	07
	OR	
Q.3	(a) Formulate the rotation matrix for rotating any object about the origin.	03
	(b) Explain concatenated transformation matrix.	04
	(c) A triangle PQR, having coordinate position of point P (0,0) Q (4,0) and R (2,3) is translate through 4 and 2 units along X and Y direction respectively and then rotated 90° in anticlockwise direction about new position of point R. Find new vertices of the triangle.	07
Q.4	(a) Enlist various graphic standards with full name.	03
	(b) Explain shape functions in natural coordinate system.	04
	(c) Derive the parametric equation of Bezier curve.	07
	OR	
Q.4	(a) Explain the three forms of equations used in Johnsons' method of optimum design.	03

- (b) Differentiate between wireframe modeling and solid modeling technique for CAD. 04
- (c) What do you understand by geometry and topology in solid modelling? Explain with neat diagram. 07
- Q.5 (a) Explain Plain Stresses and Plain Strains in FEA. 03
- (b) Explain the following with reference to optimization: 04
- i) Objective function ii) Constraints
- (c) A stepped bar is made of two materials joined together as shown in figure 1. The bar is subjected to an axial pull of 10 kN. Determine displacements and stresses of each of the section, using a 1D spar element. 07

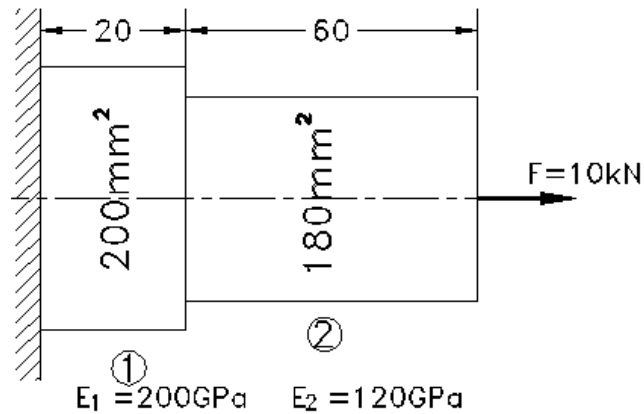


Figure 1

OR

- Q.5 (a) Discuss applications of optimization in engineering 03
- (b) List the properties of global stiffness matrix. 04
- (c) For the Loading as shown in figure 2, with the penalty approach determine the displacements and support reaction. Assume modulus of elasticity as $80 \times 10^3 \text{ N/mm}^2$. 07

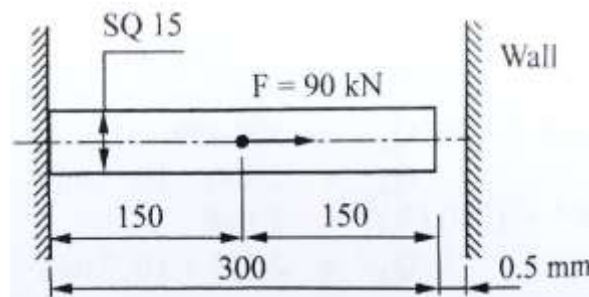


Figure 2
