

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – WINTER 2023****Subject Code:3161903****Date:05-12-2023****Subject Name: Computer Aided Design****Time:02:30 PM TO 05:00 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) List various graphics standard used for graphics data exchange in CAD.	03
	(b) Compare conventional design with Computer Aided Design.	04
	(c) What is meant by a scan conversion? Explain Bresenham's line drawing algorithm.	07
Q.2	(a) List the advantages and limitations of surface modeling.	03
	(b) Explain analytic curves and synthetic curves with example.	04
	(c) Derive general parametric equation for Hermits cubic spline curve in matrix form.	07
OR		
	(c) A cubic spline is represented by the following equation: $P(u) = C_3u^3 + C_2u^2 + C_1u + C_0$ where $0 \leq u \leq 1$ where C_3, C_2, C_1, C_0 are the polynomial coefficients. Determine the four control points of an identical Bezier curve in terms of these polynomial coefficients.	07
Q.3	(a) Write 2D transformation matrix for Scaling, Rotation and Translation.	03
	(b) Explain Projections of geometric models.	04
	(c) A Triangle PQR has its vertices at P (0,0), Q (4,0) and R (2,3). It is to be translated by 4 units in X direction, and 2 units in Y direction, then it is to be rotated in anticlockwise direction about the new position of point R through 90 degree. Find the new position of the triangle.	07
OR		
Q.3	(a) Write engineering application of Finite Element Analysis.	03
	(b) Explain homogenous coordinate transformation with its advantages.	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
Q.4	(a) State the difference between Plane truss and Space truss.	03
	(b) Write step by step general procedure for FEA.	04

- (c) Consider the bar as shown in figure 1 below. find: a) Nodal Displacement, using global stiffness matrix. b) Elemental Stresses. c) Support Reaction. 07

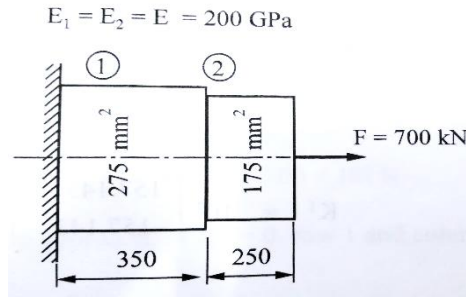


Figure 1

OR

- Q.4** (a) Discuss applications of optimization in engineering. 03
 (b) Explain Plain Stresses and Plain Strains in FEA. 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

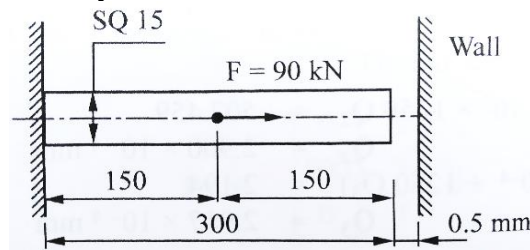


Figure 2

- Q.5** (a) Explain Penalty approach to solve FEA problem. 03
 (b) Discuss the properties of global stiffness matrix. 04
 (c) Explain Johnson's method of optimum design with an example 07

OR

- Q.5** (a) What do you understand by geometry and topology in solid modelling? 03
 (b) What do you mean by thermal effects of temperature? How is it included in calculation for 1-D elements? 04
 (c) What are different representation schemes for solid models? Compare CSG and B-rep techniques of solid modeling 07
