

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2023****Subject Code:3161903****Date:06-07-2023****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) List the steps involved in Finite Element Analysis. | 03 |
| | (b) List commercially available CAD softwares and write features of CATIA and ANSYS Software. | 04 |
| | (c) What do you understand by geometry and topology in solid modelling? Explain with neat diagram. | 07 |
| Q.2 | (a) Write specifications of CAD Work-station. | 03 |
| | (b) Explain with neat diagram organization of Raster scan system with display processor | 04 |
| | (c) Write Bresenham's line algorithm for slope ≤ 1 . Draw neat diagram. | 07 |
| OR | | |
| | (c) Generate a straight line connecting two points (21, 11) and (26, 15), using Bresenham's algorithm. | 07 |
| Q.3 | (a) Write a note on Explicit non-parametric representation. | 03 |
| | (b) Write comparison between Analytical and Synthetic curves. | 04 |
| | (c) Write parametric equation of Bezier Curve and list its characteristics. | 07 |
| OR | | |
| Q.3 | (a) Compare Hermit Cubic spline Curve, Bezier Curve and B –Spline Curve. | 03 |
| | (b) List methods of geometric modeling. Explain Wire frame modeling. | 04 |
| | (c) Derive the parametric equation of Hermite Cubic spline. | 07 |
| Q.4 | (a) Compare B-Rep and C-Rep. | 03 |
| | (b) Explain Boolean operations for Constructive Solid Geometry. | 04 |
| | (c) Prove that differential scaling and rotation are not commutative, but uniform scaling and rotation are commutative. | 07 |
| OR | | |
| Q.4 | (a) Explain concatenated transformation matrix. | 03 |
| | (b) For a given point P(1,3,-5), find: The transformed point P', if P is translated by $d=2i+3j-4k$ and then rotated by 30° in anti-clock wise direction about the Z-axis. | 04 |
| | (c) Derive the equation for transformation by Reflection for all its types. | 07 |
| Q.5 | (a) Explain types of projection with neat diagram. | 03 |
| | (b) Explain plain strain and plain stress problem. | 04 |
| | (c) A stepped bar is subjected to an axial load of 35 kN, as shown in Figure below. Determine the nodal displacement, reaction forces and stress in each elements, using penalty method. | 07 |

OR

- Q.5** (a) List types of 1D and 2D elements. **03**
(b) Explain shape function. **04**
(c) Consider the stepped bar shown in figure given below. A load of $P=200\text{kN}$ is applied as shown. Determine the nodal displacements, element stress and support reactions, using elimination approach for boundary conditions. **07**
Take $E = 2 \times 10^5 \text{ N/mm}^2$.
