

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- VI (New) EXAMINATION – WINTER 2019

Subject Code: 2161903

Date: 12/12/2019

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.

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) Determine the pixels for a straight line connecting two points (19, 38) and (38, 52) using DDA algorithm. **04**
 (c) Enlist different commercial CAD software available and explain the features of any two CAD software in detail. **07**
- Q.2** (a) For the position vectors $P_1 [1 \ 2]$ and $P_2 [4 \ 3]$, determine the parametric representation of line segment between them. Also determine the slope and tangent vector of line segment. **03**
 (b) Explain analytic curves and synthetic curves with example. **04**
 (c) Short note: Graphic exchange standard. **07**
- OR**
- (c) Derive general parametric equation for Hermits cubic spline curve in matrix form. **07**
- Q.3** (a) Derive vector equation of line in parametric form **03**
 (b) Differentiate between wireframe modeling and solid modeling technique. **04**
 (c) Compare CSG and B-rep techniques of solid modeling. **07**
- OR**
- Q.3** (a) Write limitations of a wire frame model. **03**
 (b) With example clearly define the term topology as used in modeling **04**
 (c) A polygon having vertices A (-2, 0), B (0,-1), C (2,0) and D (0,1) is to be reflected about line $Y = 0.5X + 1$. Find the vertices of polygon. **07**
- Q.4** (a) What is geometric transformation? Explain any one in detail. **03**
 (b) What are homogeneous coordinate systems? Write the matrix transformation in homogeneous form for clockwise rotation about origin **04**
 (c) Explain Projections of geometric models. **07**
- OR**
- Q.4** (a) Write engineering application of Finite Element Analysis **03**
 (b) Explain windows to viewport transformation **04**
 (c) A load member is as shown in Figure 1. The loading is initially done at 20°C. The temperature then rises to 60°C. Determine nodal displacement and element stress developed. **07**

	Element 1	Element 2
Modulus of Elasticity E	72 GPa	210 GPa
Coefficient of Thermal Expansion, α	23×10^{-6} per °C	12×10^{-6} per °C



Figure 1

- Q.5 (a) Explain potential energy equation, used in FEA 03
(b) Write general procedure for FEA 04
(c) Derive equation of global stiffness matrix for 1D linear element considering thermal effect. 07

OR

- Q.5 (a) Explain CST element defects 03
(b) Explain types of elements used in FEM 04
(c) A two member truss is as shown in Figure 2. The cross sectional area of each member is 200 mm^2 and the modulus of elasticity is 200 GPa . Determine the deflections, reactions and stresses in each of the members. 07

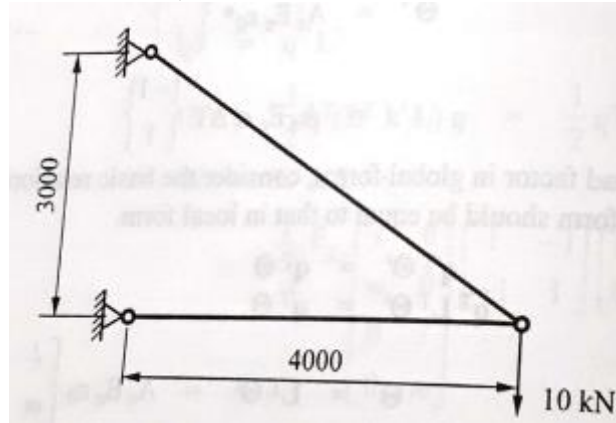


Figure : 2
