

**GUJARAT TECHNOLOGICAL UNIVERSITY**
**BE - SEMESTER-VI(NEW) – EXAMINATION – SUMMER 2019**
**Subject Code:2161903**
**Date:21/05/2019**
**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.

		Marks
<b>Q.1</b>	(a) How many bytes are used for 1 MB requirement? A raster system has resolution $1024 \times 1024$ . Compute the size of frame buffer (in Megabytes) to store 12 bits per pixel. If a refresh rate of 60 Hz non-interlaced then find time require to display a pixel.	<b>03</b>
	(b) Draw a block diagram of the manufacturing process of typical product cycle. Which process is the backbone of the manufacturing process?	<b>04</b>
	(c) Rasterize pixel locations for a straight line from A(5,10) to B(15,30) using DDA.	<b>07</b>
<b>Q.2</b>	(a) The end points of line are $P_1(1, 6, 8)$ and $P_2(-5, 8, -2)$ . Determine (i) Parametric equation of line (ii) Tangent vector of line (iii) Length of line	<b>03</b>
	(b) Differentiate between analytic and synthetic curves. Explain various types of continuity used in synthetic curves.	<b>04</b>
	(c) The end points of cubic spline curve are $P_0(1,2)$ and $P_1(7,1)$ . The tangent vector for end $P_0$ is given by line joining $P_0$ and point $P_2(-2,1)$ . The tangent vector for end $P_1$ is given by line joining $P_3(9,-2)$ and point $P_1$ . Determine the parametric equation of Hermite's cubic spline curve Compute points on curve at $u=0.2, 0.5$ and $0.8$ .	<b>07</b>
	<b>OR</b>	
	(c) Derive equation of Bezier's curve with 5 control points. State the order of the curve generated by these control points. What do you mean by 'Convex hull' property?	<b>07</b>
<b>Q.3</b>	(a) Write full form of followings: (i) OLED (ii) LCD (iii) IGES	<b>03</b>
	(b) What do you mean by "Ortho" in Orthographic projection? Derive expression of top view of an orthographic projection.	<b>04</b>
	(c) Derive the equations of linear shape functions. Draw a neat sketch of both shape functions. What do you mean by 'Iso-parametric formulations' of the problems?	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Differentiate between Hermite's cubic spline and Bezier's Curve.	<b>03</b>
	(b) Explain perspective projection with neat sketch.	<b>04</b>
	(c) Derive the equation of quadratic shape functions $N_1$ , $N_2$ and $N_3$ . Draw a neat sketch of all shape functions.	<b>07</b>
<b>Q.4</b>	(a) State any three methods used to solve structure problems using FEM. Write various applications areas of FEM.	<b>03</b>
	(b) Explain concept of plane stress and plane strain with examples.	<b>04</b>
	(c) Write element connectivity table and formulate the global stiffness matrix. $A_1=500 \text{ mm}^2$ , $A_2=1200 \text{ mm}^2$ and $E=200\text{GPa}$ for the two bar truss shown in figure 1.	<b>07</b>

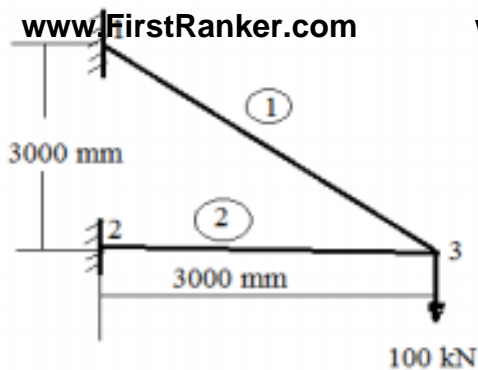


Figure 1

OR

- Q.4** (a) What is 'Discretization'? Mention the precautions required during discretization process. **03**
- (b) Evaluate the shape functions  $N_1$ ,  $N_2$  and  $N_3$  at the interior point  $P(3.85, 4.8)$  for constant strain triangular element. The coordinates of CST are  $(x_1, y_1) = (1.5, 2)$ ,  $(x_2, y_2) = (7, 3.5)$  and  $(x_3, y_3) = (4, 7)$  respectively for nodes 1, 2 and 3. **04**
- (c) Consider a bar as shown in figure 2. An axial load of 200 kN is applied at point P. Take  $A_1 = 2400 \text{ mm}^2$ ,  $E_1 = 70 \text{ GPa}$ ,  $A_2 = 600 \text{ mm}^2$  and  $E_2 = 200 \text{ GPa}$ . Calculate the following (i) The nodal displacement (ii) Stresses in each element (iii) Reactions at supports **07**

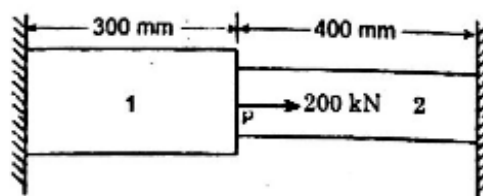


Figure 2

- Q.5** (a) Write matrices for 2D-translation, rotation about Y-axis and scaling for object in 3D space using homogeneous coordinates. **03**
- (b) Differentiate between geometry and topology. Write any four properties of solid models. **04**
- (c) A triangle ABC is represented as A (12,10), B (20,15) and C (30,30). If it is mirrored about a line  $y = -10$ , determine the new coordinates of the triangle. **07**

OR

- Q.5** (a) State various surface entities used for surface modelling. Explain surface of revolution with at least two examples. **03**
- (b) What is Constructive Solid Geometry representation approach? Explain with suitable example. **04**
- (c) Explain window to view port transformations. **07**

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