Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – WINTER 2015

Subject Code: 172006 **Date:04/12/2015**

Subject Name: Computer Aided Design for Mechatronics

Time: 10:30am to 1:00pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain the significance of Computer Aided Design in solving general Engineering problems.	**07**
	(b)	What is geometric modeling? Explain the three types of models i.e.wireframe, surface and solid models with its advantage and disadvantages.	**07**
Q.2	**(a)**	Explain the components of hardware of CAD system	**07**
	(b)	Describe the characteristics of Bezier curve. Also explain the limitations of hermite cubic curve.	**07**
		OR	
	(b)	Differentiate between: 1. Vector display and Raster display 2. CRT and LCD displays	**07**
Q.3	**(a)**	Explain Constructive Solid geometry (CSG)	**07**
	(b)	The end point of a Bezier curve are P_0 (1, 3) and P_3 (7, 2). The other control points of the Bezier curve are P_1 (5, 6) and P_2 (6, 0).Value for u= 0, 0.2, 0.4, 0.6, 0.8 and 1. 1. Determine the parametric equation of curve. Plot the Bezier curve if the direction of polygon is $P_0 – P_1 – P_2 – P_3$.	**07**
		OR	
Q.3	**(a)**	Explain Boundary Representation	**07**
	(b)	A generalized parametric representation of Hermite Cubic spline is: $P(u) = (2u^3-3u^2+1)P_0 + (-2u^3+3u^2)P_1 + (u^3-2u^2+ u)P_0' + (u^3- u^2)P_1'$ Prove that the blending functions of the Hermite cubic spline curve are symmetric. What is the consequence of this symmetry?	**07**
Q.4	**(a)**	Define Rotation and scaling in 2D transformations. Prove that reflection along y = -x is equal to reflection about y=x followed by counterclockwise rotation by 90 degree.	**07**
	(b)	Write bresenham's algorithm for generation of line. Determine the pixels to be plotted when a line is to be drawn from the position (7, 3) to (1, 1) using DDA algorithm and also write the limitation of DDA algorithm.	**07**
		OR	
Q.4	**(a)**	Explain the different types of graphics standards and their applications.	**07**
	(b)	Differentiate DDA and Bresenhams algorithm. Give suitable examples of each.	**07**

Q.5 **(a)** Explain the following **07**

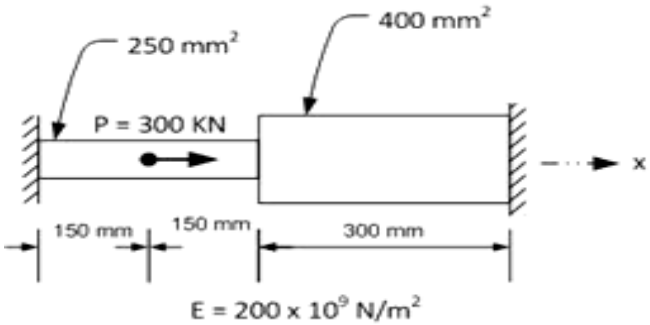
- Discretization
- Global stiffness matrix
- Types of Elements

(b) Explain the principle of minimum potential energy and derive the global stiffness matrix for a bar element. **07**

OR

Q.5 **(a)** State the advantages and limitations of FEM as an analysis method and also write the FEA application. **07**

(b) Determine the nodal displacements, element stresses, and support reactions. Use elimination methods for handling boundary conditions Consider the bar in Fig loaded as shown. **07**



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