Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2024

Subject Code:3161903 Date:25-11-2024

Subject Name:Computer Aided Design

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

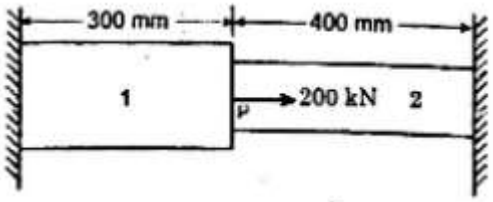
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Clearly distinguish between conventional design and CAD.	**03**
	(b)	Explain different coordinate systems available in a CAD software.	**04**
	(c)	Write Breshnham's algorithm for line having slope less than 45°.	**07**
Q.2	**(a)**	State the role of graphics standards in CAD. List various graphics standards with their full name	**03**
	(b)	(i) List various data exchange formats. (ii) Explain GKS standard.	**04**
	(c)	Explain Hermit cubic spine curve with neat sketch. Also write its characteristics and obtain the parametric equation for the same.	**07**
		OR	
	(c)	The coordinates of four control points P0, P1, P2 and P3, relative to WCS are: (3,3,0), (3,4,0), (4,4,0) and (4,3,0) respectively. Find the equation of the Bezier curve and determine the coordinates of points on curve for u = 0, 0.25, 0.5, 0.75 and 1.0.	**07**
Q.3	**(a)**	Briefly discuss about B-spline curve.	**03**
	(b)	Differentiate between wireframe modeling and solid modeling technique for CAD.	**04**
	(c)	The three vertices of triangle PQR are: P(50,20), Q(110,20) and R(80,60). Determine the coordinates of the vertices for the new reflected triangle, if it is to be reflected about: (i) X-axis and (ii) line y=x	**07**
		OR	
Q.3	**(a)**	Prepare the detailed specification for a CAD workstation.	**03**
	(b)	Explain properties of Bezier curve.	**04**
	(c)	A rectangle is formed by four points: A(25,25), B(25,125), C(75,125), and D(75,25). Calculate the coordinates of transformed rectangle if: (i) It is changed by scaling factors Sx = 0.4 and Sy = 0.6 (ii) The center remains at same position after scaling and scaling factor is 1.5	**07**
Q.4	**(a)**	What is Geometric Transformation?	**03**
	(b)	Explain with suitable example, transformation matrix in homogeneous coordinate system.	**04**
	(c)	What is feature based modeling? Discuss various steps involved in creation of models using features.	**07**
		OR	
Q.4	**(a)**	Give step by step procedure of Finite Element Analysis	**03**
	(b)	Explain with neat sketch octree encoding technique used in solid modeling.	**04**
	(c)	Discuss applications of optimization in engineering.	**07**

Q.5 **(a)** What is discretization in finite element analysis? **03**

(b) Explain the following with reference to optimization: i) Objective function ii) Constraints **04**

(c) Consider a bar as shown in below figure. An axial load of 200KN is applied at point P. Take A1=2400 mm2 , E1=70GPa, A2=600 mm2 and E2=200GPa. Calculate the following (i) The nodal displacement (ii) Stresses in each element (iii) Reactions at supports **07**

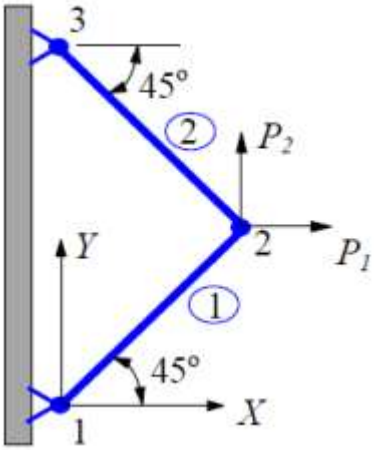


OR

Q.5 **(a)** State the properties of the global stiffness matrix **03**

(b) Explain concept of plane stress and plane strain with examples. **04**

(c) A simple plane truss is made of two identical bars (with E, A and L) and loaded as shown in below figure. Find 1) Displacement of node 2 2) Stress in each bar **07**



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