Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. SEMESTER I (old course)–EXAMINATION (Remedial) – WINTER 2015

Subject code: 710802N **Date: 09/12/2015**

Subject Name: Computer Aided Machine Design

Time: 10:30 AM to 1:00 PM **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 areas of application in which CAD is used. State the advantages of CAD.	**07**
	(b)	What is meant by a scan conversion? Explain Bresenhamôs circle drawing algorithm with the help of flow chart.	**07**
Q.2	**(a)**	Show sequence of transformation to be made to mirror any entity about the line with the equation y = mx + b.	**07**
	(b)	Digitize a line from (10,12) to (20,18) on a raster screen using Bresenhamôs straight line algorithm.	**07**
		OR	
	(b)	Plot a circle centered at (5,5) having a radius of 5 units using midpoint circle algorithm.	**07**
Q.3	**(a)**	Consider a triangle ABC having coordinates A(5,5), B(8,5) and C(5,10). Determine the new vertex positions if: (a) The triangle is rotated by 60° anticlockwise about vertex A. (b) If it mirrored about a line y=2x+4.	**07**
	(b)	Four control points $P_0(a,b)$, $P_1(2,5)$, $P_2(4,4)$ and $P_3(7,c)$ are available for drawing a uniform quadratic B-spline curve segment. Compute the values of a, b and c such that the curve starts from the point (1,4) and terminates with slope (-0.5).	**07**
		OR	
Q.3	**(a)**	What are the difficulties with wire frame modeling? How surface modeling overcomes these difficulties?	**07**
	(b)	Describe the concept of feature based modeling with significance. Give examples of software which incorporate such concept.	**07**
Q.4	**(a)**	Prepare an algorithm and write a program to find thickness of cylindrical pressure vessel.	**07**
	(b)	What do you mean by parametric and non parametric representation of surfaces? Derive parametric representation of any one analytic surface.	**07**
		OR	
Q.4	**(a)**	What is B-rep and CSG technique in solid modeling? Compare them.	**07**
	(b)	State the characteristics of B spline curve. Compare it with Bezier curves.	**07**
Q.5	**(a)**	Distinguish between engineering design and optimum design. Also state the various optimization techniques.	**07**

(b) A shaft is transmitting a torque of 1500 Nm. The torsional stiffness of the shaft should be 100 Nm/degree and the factor of safety is 2. Using maximum shear stress theory, design the shaft with the objective of minimum weight. Use the following materials: **07**

Material	**Mass density (N/cm^3)**	**Yield strength (N/mm^2)**	**Shear modulus (N/mm^2)**
Chromium steel	0.10	420	84000
Stainless steel	0.11	230	84000
Titanium alloy	0.06	910	42000
Magnesium alloy	0.02	224	12000

OR

Q.5 **(a)** Explain Johnsonôs method of optimum design stating basic steps and classification. **07**

(b) List major CAD softwares available in the market. List and explain major solid modeling facilities available in Pro/E software. **07**

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