Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Regular Examination January / February 2011

Subject code: 710802 N
Subject Name: Computer Aided Machine Design

Date: 01 /02 /2011 **Time: 02.30 pm – 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.**

Q.1 **(a)** Enlist the application of CAD in mechanical engineering. State the potential advantages of CAD. **07**

(b) Write an algorithm and a C program to scan convert a line with slope m > 1 using Bresehnam's Algorithm. **07**

Q.2 **(a)** Explain in brief **07**
i) Scan Conversion and Frame Buffer
ii) Homongenous coordinate system and its importance in CAD

(b) Explain Bresehnam's Algorithm for scan converting ellipse. **07**

OR

(b) Given B0 [1,1], B1 [2,3], B2 [4,3] and B3 [3,1] the vertices of a Bezier curve. Determine seven points on the Bezier curve. **07**

Q.3 **(a)** Write Bresenham's algorithm for scan conversion of a circle with the help of a flowchart. **07**

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

OR

Q.3 **(a)** Explain in brief **07**
i) 3D representation schemes of Geometric Models
ii) Graphics Standards

(b) Reflect a diamond shaped polygon whose vertices are A(-1,0), B(0,2), C(1,0) and D(0,2) about **07**
i) the horizontal line y = 2
ii) the vertical line x = 2
iii) the line y = x + 2

Q.4 **(a)** Prepare an algorithm and write a C program to design a helical spring with different ends. The output of the program should be spring parameters such as wire diameter, coil diameter, number of turns, free length, pitch etc. **07**

(b) Explain B-spline curves and Ruled surfaces in brief. **07**

OR

Q.4 **(a)** Prepare a flow chart and write a C program to design a shaft for combined twisting and bending effects. Clearly mention the inputs and outputs of the program. **07**

(b) Write short notes on **07**
i) Spatial Decomposition Models
ii) Boundary Representation Models

Q.5 **(a)** Explain constraint surfaces in a hypothetical 2D design space. Also explain objective function, design variables and design constraints citing examples. **07**

(b) Design a tensile bar of length 300 mm to carry a tensile load of 6 KN for minimum cost, out of the following materials using Johnson's method. **07**

Material	Mass Density (kg/m^3)	Material Cost (Rs / N Weight)	Yield Strength (MPa)
Steel	7500	16	130
Aluminum Alloy	3000	32	50
Titanium Alloy	4800	480	90
Magnesium Alloy	2100	32	20

OR

Q.5 **(a)** Explain basic steps in Johnson's method of optimum design. Also give engineering applications of optimisation. **07**

(b) Explain various properties of Bezier curves. **07**

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