

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : V

MANUFACTURING ENGINEERING

Subject Name: **COMPUTER AIDED DESIGN AND ANALYSIS**

Sr. No.	Course Contents
1.	INTRODUCTION Introduction to Design process - CAD. Geometric Modeling: Types - Wireframe, surface and solid modeling. Solid Modeling Techniques: CSG and B-rep - Operations: Boolean - Extrude - Sweep - Revolve. Entities - Line - Circle - Ellipse - Parabola - Cubic Spline, Bezier and B-spline (Basic treatment only).
2.	GRAPHICS CONCEPTS (2D and 3D) Coordinate systems - Transformations: translation, scaling, reflection, rotation - Concatenated transformation - Inverse transformation. Hidden line removal - Shading - Colouring - Rendering - Animation (Basic treatment only).
3.	SOFTWARE PACKAGES AND RECENT TECHNOLOGY Commercial solid modeling packages: Salient features - Technical comparison - Modules and tools - Brief outline of data exchange standards. Brief outline of feature technology: Classification of features - Design by features - Applications of features - Advantages and limitations.
4.	FEM FUNDAMENTALS Introduction - Steps involved in FEA: Nodes - Elements and their types, shape function, constraints, forces and nodal displacements - Stiffness matrix - Solution techniques. Analysis of spring element. Simple problems involving stepped bar subject to axial loading and simple structural members with triangular element.
5.	ANALYSIS Stages of FEA in CAD environment - Preprocessor - Solver and postprocessor. Demonstration of the above using any one commercial packages. Brief outline of kinematic analysis - Manufacturability analysis and simulation.

Text Books:

1. Ibrahim Zeid, CAD / CAM - Theory and Practice, Tata Mcgraw-Hill, New Delhi, 2001
2. Radhakrishnan. P., CAD / CAM / CIM - New age international, 2000
3. Chairs McMahon and Jimmie Browne, CAD/CAM, Addison Wesley, New York, 2000

Reference Books:

1. Chandupatla and Belagundu, Introduction to Finite Element Methods in Engineering, Prentice Hall of India Private Limited, New Delhi, 1997
2. Newman and Sproull R. F., Principles of interactive computer graphics, Tata Mcgraw-Hill, New Delhi, 1997
3. Mikell P. Groover, CAD/CAM, Prentice Hall of India Private Limited, New Delhi, 1997