GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3162006
Semester – VI
Subject Name: Computer Aided Design and Modeling

Type of course: Professional Elective Course

Prerequisite: Zeal to learn the subject

Rationale: This course provides the students greater depth of technical knowledge in the areas of design using modeling and analysis software's. To learn detailed engineering of 3D models and application of computer system to a solution of design problem.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	FUNDAMENTAL OF CAD: Introduction to CAD and Design process, Product cycle and CAD, Importance of Computer graphics and CAD, Reasons for implementing cad, conventional design vs CAD, Computer system hardware and software, Applications and benefits of CAD	4
2	CAD SYSTEM : CAD system configuration, Hardware : Display devices, Hard-copy devices, Interactive input devices, Display processors Software : Features, Graphic standards: GKS, PHIGS, IGES, STEP and PDES Graphics and computing standards, data exchange standards, Design Database, Interfacing design and drafting	5
3	FUNDAMENTALS OF COMPUTER GRAPHICS: Homogeneous coordinate system, Output primitives and their attributes, 2D and 3D transformations: scaling, translation, rotation, mirroring, clipping, shearing, scan conversion, Rasterisation :DDA & Bresenham's algorithm, discussion extended to circle generation	6
4	GEOMETRICAL MODELING: Types & mathematical representation of curves, wire frame models, entities, representations, parametric representations Curves: synthetic and analytic curves, parametric representation of line and circle, Cubic splines and Bezier curves, concept of blending shape function Surfaces & solids – model, entities, representations, fundamentals of surface and solid	16

	modeling, B-rep, constructive solid geometry (CSG), analytical modeling, Boolean operation, Feature based Parametric and Variational modeling, Computer aided design of Mechanical Elements & Mechanical Assembly with animation, Capabilities of various commercially available software in the area of CAD	
5	Optimization: Introduction, design synthesis, Engineering vs Optimum Design, Objectives of Optimization, Classification of Optimization problems and their procedure, techniques of optimization, Optimized design of machine components.	7

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
35	**30**	**15**	**10**	**5**	**5**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Computer Graphics - Hearn & Baker, PHI
2. CAD/CAM: Computer Aided design and Manufacturing by Mikell Groover and Zimmer, Pearson Education
3. Mathematical Elements for Computer Graphics - David F. Rogers & J. Alan Adams, McGraw Hill
4. Optimization Methods by S.S. Rao, New Age International Publications
5. CAD/CAM Theory & Practice by Ibrahim Zeid, Tata Mc Graw Hill
6. Computer Graphics & design by P. Radhakrishnan, C.P. Kothanadaraman, New Age publication

Course Outcomes:

After successful completion of the course the students shall be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings.	30
CO-2	Understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.	30

CO-3	Learn to create shapes including various curves and surfaces used in different mechanisms.	20
CO-4	Learn to optimize the design of machine components.	20

List of Experiments:

01 Introduction to Creo parametric 2.0
02 Sketching features
03 Geometric features
04 Datum commands
05 Creating solids
06 Modifying features
07 Drafting features
08 Generating assembly hierarchy
09 Constructing assembly
10 Generating sequence and animation

Major Equipment:

Creo parametric 2.0 software or other equivalent software

List of Open Source Software/learning website:

The website of NPTL may be utilized for additional learning.