Gautam Buddha University, Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
Integrated B. Tech. + M. Tech. / M.B.A.	Computer Aided Design	ME 403	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
VII	4	3-1-0	3 Hours

Unit - I

Introduction: Introduction to CAD/CAED/CAE; Elements of CAD; Essential requirements of CAD; Concepts of integrated CAD/CAM; Necessity & its importance; Engineering applications.

Collaborative Engineering: Collaborative design; Principles; Approaches; Tools; Design Systems; Product data management (PDM). **(06 Hours)**

Unit - II

Computer Graphics-I: CAD/CAM systems; Graphics input devices-cursor control Devices; Digitizers; Keyboard terminals; Image scanner; Speech control devices and touch; Panels; Graphics display devices; Cathode ray tube; Random & raster scan display; Colour CRT monitors; Direct view storage tubes; Flat panel display; Hard copy printers and plotters. **(07 Hours)**

Unit - III

Computer Graphics-II: Graphics standards; Graphics software; Software configuration; Graphics functions; Output primitives- Bresenham's line drawing algorithm and Bresenham's circle generating algorithm.

Geometric Transformations: World/device Coordinate representation; Windowing and clipping; 2 D geometric transformations; Translation; Scaling; Shearing; Rotation & reflection matrix representation; Composite transformation; 3 D transformations; Multiple transformation. **(08 Hours)**

Unit - IV

Curves: Curves representation; Properties of curve design and representation; Interpolation vs approximation; Parametric representation of analytic curves; Parametric continuity conditions; Parametric representation of synthetic curves-Hermite cubic splines; Blending function formulation and its properties; Bezier curves-Blending function formulation and its properties; Composite Bezier curves; B-spline curves and its properties; Periodic and non-periodic B-spline curves. **(08 Hours)**

Unit - V

3D Graphics: Polygon surfaces-Polygon mesh representations; Quadric and Super-quadric surfaces and blobby objects; Solid modeling-solid entities; Fundamentals of solid modeling-set theory; Regularized set operations; Half spaces; Boundary representation; Constructive solid geometry; Sweep representation; Color models; Application commands for CAD software.

(08 Hours)

Unit - VI

Advanced Modeling Concepts: Feature based Modeling; Assembly modeling; Behavioral modeling; Conceptual design & top-down design; Techniques for visual realism - hidden line - surface removal; Algorithms for shading and Rendering; Parametric and variational modeling; Feature recognition; Design by features; Assembly and tolerance modeling; Tolerance representation - specification; Analysis and synthesis; AI in Design. **(08 Hours)**

Recommended Books:

1. Computer Aided Engineering Design; Anupam Saxena & B. Sahay; Anamaya Publishers.
2. Computer Graphics; Hearn & Baker; Prentice Hall of India.
3. CAD/CAM; Mikell P. Groover & E. W. Zimmers Jr.; Prentice Hall India Ltd.
4. CAD/CAM; P. N. Rao; Tata McGraw Hill.