SEMESTER – II

17MD002COMPUTER AIDED DESIGN

COURSE CODE	COURSE TITLE	L	P	T	C
17MD002	COMPUTER AIDED DESIGN				

Course Description and Objectives:

To impart fundamental knowledge to students in the latest technological topics on Computer Aided Design, Computer Aided Engineering Analysis and to prepare them for taking up further research in the areas.

Course Outcomes:

Upon successful completion of this course the student will be able to:

- Apply the concept of CAD in developing solutions or to do research in the areas of Design and simulation in Mechanical Engineering.
- Have abilities and capabilities in developing and applying computer software and hardware to mechanical design and manufacturing fields.
- Review and document the knowledge developed by scholarly predecessors and critically assess the relevant technological issues.
- Design and validate technological solutions to defined problems and communicate clearly and effectively for the practical application of their work.

SKILLS ACQUIRED: Students are able to

- Model a Part.
- Create an assembly of part.
- Create a detailed drawing.
- Use parametric 3D CAD software tools.
- Redesign in CAD and evaluate a mechanical product by making components in the mechanical workshop for design validation.
- Able to exchange data in different format for different software packages.

UNIT-I **L-13**

COMPUTER AIDED DESIGN
Introduction, Need of CAD, conventional design v/s CAD, CAD system architecture,Hardware and software for CAD. Role of computer in CAD, CAD Module,

Raster scan graphics: Line drawing algorithms – DDA & Bresenham algorithms, circle generation algorithms, displaying lines.

UNIT-II **L-13**

GEOMETRIC TRANSFORMATIONS
2D and 3D; transformations of geometric models like Translation,Scaling, Rotation, Reflection, Shear; Homogeneous Representations, Concatenated Representation;

LINE CLIPPING: Simple visibility algorithm, Cohen-Sutherland subdivision line clipping algorithm, midpoint sub division algorithm.

UNIT-III **L-13**

MATHEMATICAL REPRESENTATION OF CURVES
Curve representation, parametricrepresentation of analytic and synthetic curves

MATHEMATICAL REPRESENTATION OF CURVES
Surface models, Surface representations, parametric representation of analytic and synthetic surfaces.

UNIT-IV **L-13**

MATHEMATICAL REPRESENTATION OF SOLIDS
Solid models, Classification ofmethods of representations, boundary representation, CSG, sweep representations.

ASSEMBLY MODELLING
Representation, mating conditions, representation schemes, Assembly Modelling Methods: Top-down Approach & Bottom-up Approach.

UNIT-V **L-13**

OVERVIEW OF MODELLING SOFTWARE
Like Solid Works, Autodesk Inventor, AutoCAD, PRO/E, CATIA: Capabilities, Modules, Coordinate Systems, Sketching Tools, Solid Modeling Tools, Surface Modeling Tools, expression/parameters toolbox, Data Exchange standards like IGES, STEP, Model storage

LIST OF EXPERIMENTS:
The following wire frame surface and solid models can be created by using any commercial modelling package (CREO, SOLID WORKS, CATIA, Etc.)
1. Practice of Orthographic/ Isometric Projections.
2. Creation of Surface Models.
3. Creation of solid models.
4. Assembling of Mechanical CAD components.

5. Simulation of Assembly Models.

Activities:
1: Development of Part Drawing for various components.
2: Generation of various 3D model through different features.
3: Assembling of simple mechanical components.
4: Converting the format an import in different CAD Pakages.

TEXTBOOKS:
2.   I. ZEID, "CAD/CAM Theory & Practice", 2nd Edition, Tata Mc Graw Hill, 2009.

3.   Dieter George, Engineering Design – A materials and processing approach, McGraw Hill Publishers, 2000
4.   Chris McMahon and Jimmie Browne, CAD/CAM – Principle Practice and Manufacturing Management, Addison Wesley England, Second Edition, 2000.

REFERENCE BOOKS:
1. Rogers, D.F. and Adams, A., Mathematical Elements for Computer Graphics, McGraw Hill Inc, NY, 1989.
2. P. Radhakrishnan, S. Subramanayan and V.Raju, CAD/CAM/CIM, New Age International
    (P) Ltd., New Delhi.
3. Groover M.P. and Zimmers E. W., CAD/CAM: Computer Aided Design and Manufacturing, Prentice Hall International, New Delhi, 1992.
4. Dr. Sadhu Singh, Computer Aided Design and Manufacturing, Khanna Publishers, New Delhi, Second Edition, 2000.