INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

ADVANCED CAD LABORATORY								
I Semester: STE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
BSTE11	Core	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		0	0	4	2	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 45**				**Total Classes: 45**		
Prerequisite: Computer Aided Engineering Drawing								

I. COURSE OVERVIEW:

Advanced CAD Lab focuses on the application of computer-aided design tools for the modeling, analysis, and detailing of civil engineering structures. This course provides hands-on experience with advanced CAD software to develop 2D drawings, 3D models, and structural detailing in line with industry standards and codes. It emphasizes precision, efficiency, and innovation by integrating drafting techniques, parametric modeling, and visualization tools for structural engineering applications. The lab also explores interoperability with analysis software, automated detailing, and preparation of construction-ready drawings to enhance design accuracy, productivity, and professional practice in structural engineering.

II. COURSE OBJECTIVES:

The students will try to learn:

I. The fundamentals of computer-aided design tools, drafting standards, and modeling principles for understanding their role in structural engineering applications.
II. Civil engineering components and structural systems using 2D drafting, 3D modeling, and parametric design features for improving accuracy and efficiency in design documentation.
III. Advanced CAD techniques for structural detailing, interoperability with analysis software, and preparation of construction-ready drawings in compliance with industry codes and standards.
IV. Case studies and practical projects using CAD software for identifying best practices, challenges, and innovative approaches in digital design and drafting for civil engineering structures.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1 Design basic structural elements like slabs, beams, columns and stair cases etc. for construction purpose.
CO 2 Analyze technical drawings using both CAD and basic manual tools.
CO 3 Develop the drawings of structural elements for different applications.
CO 4 Build the different stages of the structure from scratch using engineering graphics techniques such as sectional projections, dimensioning and computer-generated drawings.
CO 5 Make use of software packages for creating different structural Geometry.
CO 6 Apply principles of technical drawings for producing different 3D models.

IV. COURSE CONTENT:

Week –I: DESIGN OF SLABS
Analysis and design of continuous slab & development of Excel template

Week –II: DESIGN OF DETERMINATE BEAMS
Analysis and design of determinate beams & development of Excel template

Week –III: DESIGN OF INDETERMINATE BEAMS
Analysis and design of indeterminate beams & development of Excel template

Week –IV: DESIGN AND DETAILING OF CONTINUOUS BEAMS
Analysis and design of continuous beams & development of Excel template

Week –V: DESIGN OF COLUMN USING CAD
Analysis and design of columns & development of Excel template

Week-VI: DESIGN OF FOOTING USING EXCEL
Analysis and design of footing & development of Excel template

Week-VII: DESIGN OF STAIRCASE USING EXCEL
Analysis and design of staircase & development of Excel template

Week-VIII: DESIGN OF PLANE FRAMES
Analysis and design of plane frames and development of Excel template.

Week-IX: DESIGN OF SPACE FRAMES
Analysis and design of space frames and development of Excel template.

Week-X: DESIGN OF MULTISTORIED BUILDING SUBJECTED TO DL, LL and WL
Analysis and design of a multistoried building subjected to DL, LL and WL

Week-XI: DESIGN OF MULTISTORIED BUILDING SUBJECTED TO DL, LL and EQ
Analysis and design of a multistoried building subjected to DL, LL and EQ

Week-XII: DESIGN OF ROOF TRUSSES INCLUDING WL
Analysis and design of Roof trusses including WL calculation in Excel Spreadsheet

Week-XIII: DESIGN OF GANTRY GIRDER
Analysis and design of Gantry girder and development of spread sheet

Week-XIV: 3D MODEL DEVELOPMENT
POST – Graphical Post Processing – Animation – Icons – Isometric View – Zooming-Results of Analysis & Design – Query reports.

V. TEXTBOOKS:

1. Terence M. Shumaker, David A., Madsen, "*AutoCAD and its Applications: Advanced AutoCAD"*, Good heart-Wilcox, 12th edition, 2005.
2. Gupta, Ram S. "*Principles of Structural Design: Wood, Steel, and Concrete"*. CRC Press/Taylor & Francis Group, 2nd Edition, 2014.

VI. REFERENCE BOOKS:

1. Dr M.N. Sesha Prakash and Dr. G.S. Servesh, "*Computer Aided Design Laboratory*", Laxmi Publications, 1st Edition, 2016.
2. Omura, George, and Brian C. Benton. "*Mastering AutoCAD 2018 and AutoCAD LT 2018*". John Wiley & Sons, 2017.

VII. ELECTRONICS RESOURCES:

1. https://structuralbd.com/dwg-file-sample/.
2. https://books.google.co.in/books/about/AutoCAD_and_Its_Applications.html?id=BAaznio6H5oC&redir_esc=y.
3. https://dwgmodels.com/construction_details/.

VIII. MATERIAL ONLINE:

1. Course Outline Description
2. Lab Manual