

# MEC136:ENGINEERING GRAPHICS AND DIGITAL FABRICATION

L:2 T:2 P:0 Credits:4

**Course Outcomes:** Through this course students should be able to

CO1 :: understand the fundamentals of engineering drawing including usages of drawing tools, line types, dimensioning, letter-writing, scales and AutoCAD software.

CO2 :: recognize the conceptual framework of orthographic projections of points, lines and basic commands of AutoCAD software.

CO3 :: apply the knowledge to draw the orthographic and sectional views and to create 2D drawings on AutoCAD software.

CO4 :: acquaint the techniques to develop the isometric views and surfaces of common geometries and to create 3D models on AutoCAD.

CO5 :: impart the conceptual understanding of digital fabrication and rapid prototyping techniques.

CO6 :: learn and discuss the varied important aspects of several rapid prototyping systems.

## Unit I

**Introduction to Engineering Drawing** : Conceptual framework of drawing instruments, line types, dimensioning, single stroke vertical gothic letter writing, scales-plain and diagonal, introduction to AutoCAD interface- units, limits, navigation, OSNAP, ortho, and UCS

## Unit II

**Projection of Points and Lines** : Introduction, principles of orthographic projections, orthographic projection of points and lines, concept of traces, AutoCAD commands- line, circle, arc, polyline, move, copy, trim, text, and dimensioning style, hands-on-practice on AutoCAD

## Unit III

**Orthographic and Sectional Views** : Introduction, principles, importance, orthographic and sectional (full, half, and offset) views in both first and third angle projections systems, practice, AutoCAD commands- linetype and its properties, rectangle, polygon, ellipse, hatch, scale, fillet, chamfer, array, erase, explode, offset, and extend, hands-on-practice on 2D drawings

## Unit IV

**Isometric Views and Development of Surfaces** : Introduction, terminology, isometric scale, isometric views of prisms and pyramids, dimensioning, importance of surface development, development methods, surface development of cylinder, prisms, cone and pyramids, AutoCAD commands for 3D- 3P UCS rotation, standard shapes, extrude, revolve, presspull, subtract, union, orbit, and visual styles, hands-on-practice on 3D drawings

## Unit V

**Introduction to Digital Fabrication** : Introduction, needs of digital manufacturing, prototype- types and roles, rapid prototyping (RPT)-fundamentals, phases, classification, process chain- modelling-data conversion-checking-building-postprocessing, advantages, conversion of 3D model to STL file, hands-on-practice on 2D and 3D drawings

## Unit VI

**Rapid Prototyping Systems** : Liquid-based SLA- introduction, specifications, apparatus, process, photopolymers, photopolymerization, layering, applications, solid-based LOM- introduction, process-preprocessing-building-postprocessing, materials, principle, advantages, disadvantages, applications (RPT), powder-based SLS- process, SLS materials, principle (SLS), advantages (SLS), disadvantages (SLS), applications (SLS)

## Text Books:

1. ENGINEERING DRAWING WITH AN INTRODUCTION TO AUTOCAD by DHANANJAY JOLHE, MC GRAW HILL
2. RAPID PROTOTYPING- PRINCIPLES AND APPLICATIONS by CHUA, C.K., LEONG, K.F., LIM, C.K, WORLD SCIENTIFIC

## References:

1. ENGINEERING DRAWING by N.D. BHAT & M. PANCHAL, CHAROTAR PUBLISHING HOUSE PVT. LTD.
2. ENGINEERING GRAPHICS by K C JOHN, PRENTICE HALL
3. MANUFACTURING ENGINEERING AND TECHNOLOGY by SEROPE KALPAKJIAN, STEVEN R. SCHMID, PEARSON

