

## ENGINEERING DRAWING

Course Code: 22ES11ED

L T P C

1 0 4 3

**Note: Part A is common to all branches and Part B is specific to the respective branch.**

### PART- A (Common to all branches)

**Course Outcomes:** At the end of the course, the student will be able to

**CO1:** use engineering drawing instruments to draw various engineering curves (L3)

**CO2:** show projections of lines, planes and solids (L3)

**CO3:** draw conversion of orthographic to isometric views and vice versa (L3)

#### List of Exercises (Manual Drawing)

Introduction to Engineering drawing and its significance – Conventions in drawing, lettering and BIS conventions.

1. Geometrical constructions: construct regular polygons
2. Construction of conic curves, cycloid and involute of the circle.
3. Projection of lines.
4. Projections of planes.
5. Projections of solids and section of solids in simple positions.
6. Conversion of Orthographic to Isometric views.
7. Conversion of Isometric to Orthographic views.

#### Text Books:

1. N. D. Bhatt, *Engineering Drawing*, 53<sup>rd</sup> Edition, Charotar Publishers, 2016.
2. K. L. Narayana and P. Kanniah, *Engineering Drawing*, 3<sup>rd</sup> Edition, Scitech Publishers, Chennai, 2012.

#### Reference Books:

1. Dhanajay A Jolhe, *Engineering Drawing*, 1<sup>st</sup> Edition, Tata McGraw-Hill, 2007.
2. Venugopal, *Engineering Drawing and Graphics*, 5<sup>th</sup> Edition, New Age Publishers, 2004.
3. Basant Agarwal and C. M. Agarwal, *Engineering Drawing*, 2<sup>nd</sup> Edition Tata McGraw-Hill, 2013.

**PART-B**

**CHEMICAL ENGINEERING DRAWING**

List of exercises using **MS – VISIO**:

(Any Six of the following exercises should be carried out)

**Course Outcomes:** At the end of the course the student shall be able to,

**CO4:** draw symbols for various valves and pumps (L3)

**CO5:** show different equipment with necessary input and output ( L3)

**CO6:** draw flow diagram, instrumentation diagram and layout diagram (L3)

Introduction to a diagramming tool in the preparation of PFD and P&ID diagrams – Conventions in symbols, labeling.

1. Drawing of various valves:
  - a. Valves – Gate Valve, Globe Valve, Check Valve, Plug Valve
  - b. Valves – Diaphragm valve, Needle Valve, 3-way valve, Pneumatic valve
2. Drawing of various pumps/ Compressors:
  - a. Pumps - In-line Pump, Centrifugal Pump, Positive displacement pump
  - b. Compressors – Reciprocating Compressor, Centrifugal fan, Ejector
3. Drawing of various Equipment-vessels:
  - a. Vessel, Column, Tray column,
  - b. Autoclave, Reaction Vessel,
4. Drawing of various Equipment- tanks:
  - a. Tank, Open Tank, Closed Tank, Covered tank, Gas Holder
5. Preparation of diagram:
  - a. Block Diagram (BFD)
  - b. Process Flow Diagram (PFD)
6. Preparation of diagram:
  - a. Piping and Instrumentation Diagram (P&ID)
7. Creation of Layout diagrams:
  - a. Plant Layout Diagram
  - b. Site Layout Diagram
8. Preparation of Simple Interlock Diagram

**CIVIL ENGINEERING**

**Course Outcomes:** At the end of the Course the student shall be able to:

**CO4:** construct basic geometric figures using CAD (L3)

**CO5:** demonstrate the ability to create text entities (L3)

**CO6:** construct Isometric views of objects (L3)

(Any 6 activities are to be completed)

**LIST OF EXERCISES:**

1. Point plotting using Absolute, Relative and Polar coordinate systems

2. Drawing Lines, Polylines, Rectangles, Circles, Arcs, Polygons and Ellipses using various coordinate systems
3. Editing Objects: Erase, Trim, Extend, Fillet, Stretch and selection methods by clicking, window and crossing, fence and last, add selected, deselecting objects, all objects.
4. Drawing objects using Object Snap and Polar Tracking
5. Create text entities using Single-line text and multiline text commands and editing text objects
6. Create multiple objects using Copy, Mirror and Array commands and adding hatch objects.
7. Add dimensions to drawing : associative dimensions, linear dimensions: horizontal and vertical, linear aligned dimensions; angular dimensions; dimensioning circles and arcs; adding and modifying dimension text.
8. Create isometric views of a given 3D object.

**REFERENCES :**

1. Bhatt, N.D., *Engineering Drawing*, 53<sup>rd</sup> Edition, Charotar Publishing House, 2014.
2. Venkata Reddy, K., *Textbook of Engineering Drawing*, 2<sup>nd</sup> Edition, BS Publications, 2008.
3. George Omura, Brian C. Benton, *Mastering AutoCAD*, 1<sup>st</sup> Edition, Autodesk Official Press Paperback, 2020.

**Common to CSE, IT, CSE(AI&ML), CSE(DS)**

**Course Outcomes:** At the end of the Course the student shall be able to:

**CO4:** model 3D objects for real world applications.(L3)

**CO5:** use motion effects for a real time animation. (L3)

**CO6 :**apply effects of modifiers to simulate a real time game environment.(L3)

**List of Activities:** (Any **Six** activities should be carried out)

1. Develop 3D Modeling Basics with following effects:
  - The 3D View.
  - Adding and Transforming Objects.
  - Edit Mode.
  - Light, Material, and Texture.
  - Saving Your Work.
2. Design 3D Modeling application with following features:
  - Text.
  - Curves.
  - Proportional Editing.
  - Extruding Meshes.
3. Design 3D Modeling application with Mesh Modifiers and Light & Material effects.
4. Develop a low poly model(house, vehicle, things, etc).
5. Design an Animation with following effects:

- Keyframe Animation and F-Curves.
  - Tracking.
  - Path Animation.
  - Particle Systems.
  - Rendering an Animation.
6. Design a game environment (low poly).
  7. Modifiers [50 modifiers in total].
  8. Design realistic models (high poly) [ex: glass tumbler, wooden bridge, hammer].
  9. Rigging and short animations.

**Reference Books:**

1. Lance Flavell, *Beginning Blender Open Source 3D Modeling, Animation, and Game Design*, 1<sup>st</sup> Edition, Apress, 2011.
2. James Chronister, *Blender Basics Classroom Tutorial Book*, 5<sup>th</sup> Edition, A Creative Commons Attribution-NonCommercial-Share Alike 4.0 International, License, 2017.

**Web References:**

1. <http://math.hws.edu/graphicsbook/a2/index.html>
2. <https://docs.blender.org/manual/en/latest/>
3. <https://cloud.blender.org/training/>
4. <http://www.cdschools.org/blenderbasics>

## ELECTRONICS AND COMMUNICATION ENGINEERING

**Course Outcomes:** At the end of the Course the student shall be able to:

**CO4:** sketch the connection diagrams of electronic circuits (L3)

**CO5:** illustrate the drawings of PCB footprints and CMOS fabrication steps (L3)

**CO6:** apply layout principle on different integrated circuits (L3)

(Any **SIX** of the experiments shall be conducted)

**List of Experiments:**

1. Draw the connection diagrams of basic electronic circuits
2. Draw the outline of the integrated circuit package.
3. Draw a freehand oblique sketch of a seven segment LED and rectifier
4. Draw the PCB footprints of Resistor, Capacitor, and Transistor
5. Draw the PCB layout of RC circuit using active and passive components
6. Draw the CMOS fabrication steps
7. Draw the stick diagrams-NMOS & PMOS Encoding
8. Draw stick diagrams of Basic Gates
9. Consider the logic expression  $F = \sim(ab(c + d))$ . Convert this function to a schematic diagram for static CMOS Logic, then convert it to a stick diagram layout.
10. Lambda based design rules: Design rules for wires, transistors, metal layers, and polysilicon
11. Draw the layout of CMOS NAND gate using  $2\mu\text{m}$  design rules

12. Draw the layout of CMOS NOR Gate using 1.2 $\mu$ m design rules
13. Draw the CMOS XOR Gate PCB layout and 2 $\mu$ m design rules layout
14. Draw the CMOS Full Adder PCB layout and 2 $\mu$ m design rules layout

### For ELECTRICAL AND ELECTRONICS ENGINEERING

**Course Outcomes:** At the end of the Course the student shall be able to:

**CO4:** understand the basic symbols and their connections in wiring diagrams. (L2)

**CO5:** describe the wiring diagram of residential power distribution arrangement. (L2)

**CO6:** select/identify the different electrical components used in residential and commercial applications. (L5)

**List of exercises:** (Any Six of the experiments are to be conducted)

The students will develop the following using electrical drawing software:

1. Introduction to Electrical symbols used in wiring diagrams.
2. Wiring diagram of Series and Parallel circuits for lamp loads.
3. Wiring diagram of lighting circuit using two-way switches for Staircase wiring.
4. Wiring diagram of lighting circuit using two-way switches for Godown Wiring.
5. Wiring diagram of residential power distribution arrangement
6. Wiring diagram of ceiling fan.
7. Single line diagram of Single Feeder Substation.
8. Wiring diagram of Half and Full wave Rectifier circuit.
9. Wiring diagram for a 3-phase Induction Motor with a starter.

**Web Reference:**

<http://1.droppdf.com/files/YooGv/autocad-electrical-2016-black-book-by-gaurav-verma-2015.pdf>

### Common to MECHANICAL ENGINEERING, MECHANICAL ENGINEERING (Robotics)

**Course Outcomes:** At the end of the Course the student shall be able to:

**CO4:** model section of solids using CAD package (L3)

**CO5:** model the development of surfaces and intersection of solids using CAD Package (L3)

**CO6:** model isometric, orthographic and 3D solid models using CAD package (L3)

#### List of Exercises (Computer Aided Drafting)

Introduction to CAD package: units, coordinate systems, elements of drawing, transformations, dimensions in drawing and basic 2D drawings of mechanical components.

1. Section planes and sectional view of right regular solids - prism, cylinder.
2. Section planes and sectional view of right regular solids - pyramid and cone.

3. Development of surfaces of right regular solids - prism, cylinder, and their sectional parts.
4. Development of surfaces of right regular solids- pyramid, cone and their sectional parts.
5. Intersection of solids in simple positions.
6. Orthographic Projections: Systems of projections, Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views.
7. Introduction to 3D Solid modeling, box, cone, cylinder, sphere, wedge, Boolean operations, 3D commands.

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