

10.1.0 BASIC ENGINEERING DRAWING

10.1.01 Introduction

This module is designed to equip the trainee with the necessary skills and attitude in geometric and engineering drawing.

10.1.02 General Objectives

By the end of the module, the trainee should be able to:

- a) understand the principles of mechanical engineering drawing
- b) read and interpret engineering drawing
- c) communicate effectively using drawings and symbols

10.1.02 Module Unit Summary and Time Allocation

Basic Engineering Drawing

Code	Sub Module Unit	Content	Time Hrs
10.1.1	Introduction to Engineering Drawing and Design	<ul style="list-style-type: none">• Drawing instruments• Drawing Office• Drawing paper	6
10.1.2	Paper Layout	<ul style="list-style-type: none">• Paper layout• Lettering• Numbering	6
10.1.3	Plane Geometry	<ul style="list-style-type: none">• Straight lines• Common angles• Triangles• Quadrilaterals• Polygons• Circles	6
10.1.4	Blending of Lines and Arcs	<ul style="list-style-type: none">• Straight lines• Arcs• Circles	6
10.1.5	Tangents	<ul style="list-style-type: none">• Circles and tangents• Common tangents• External and Internal tangents	6
10.1.6	Pictorial & Orthographic Projections	<ul style="list-style-type: none">• Pictorial and• Orthographic• Isometric oblique	21

		<ul style="list-style-type: none"> • Cavalier, cabinet • 1st angle projection and • rd angle 	
10.1.7	Lines In Space	<ul style="list-style-type: none"> • True length • Traces of the straight • Line given the Plan and elevation. • True angle between the • VP and the oblique plane • True shape of a lamina 	12
10.1.8	Solid Geometry	<ul style="list-style-type: none"> • Solid Geometry • Surface development • Intersection of Geometrical objects • Auxiliary views 	12
10.1.9	Conic Sections	<ul style="list-style-type: none"> • Ellipse • Parabola • Hyperbola 	12
10.1.10	Loci and mechanisms	<ul style="list-style-type: none"> • Loci of plane figures • Loci of rigid link • mechanisms 	12
Total Time			99

10.1.1 INTRODUCTION TO ENGINEERING DRAWING AND DESIGN

10.1.1P0 *Specific Objectives*

By the end of the sub-module unit the trainee should be able to:

- a) appreciate the need for engineering drawing
- b) identify drawing instruments and equipment
- c) use drawing instruments and equipment correctly

10.1.1C **Competence**

The trainee should have the ability to:

- i) Sharpen pencils
- ii) Set the compass
- iii) Select paper size
- iv) layout paper

Content

10.1.1P1 Need for engineering drawing

10.1.1P2 Drawing instruments and Equipments

- i) T-Square
- ii) Set squares
- iii) Drawing board
- iv) Types of pencils
- v) Drawing set
- vi) Eraser
- vii) Drawing paper
- viii) Paper sizes
- ix) Square grid and isometric grid

10.1.1P3 Correct use of drawing instruments and equipment

Suggested Learning Resources

- Drawing office
- Drawing text books
- Mechanical drawing boards
- Manual drawing boards
- The Internet

10.1.2 PAPER LAYOUT

10.1.2P0 *Specific Objectives*

By the end of the sub-module unit the trainee should be able:

- a) layout the paper correctly
- b) print letters and numbers to the required standard

10.1.2C **Competence**

The trainee should have the ability to:

- i) Set out the drawing paper on the drawing board
- ii) Draw boarder lines and title block
- iii) Print numbers and letters correctly.

Content

10.1.2P1 Paper layout

- i) Boarder lines
- ii) Outlines
- iii) Masking the paper on the board
- iv) Construction lines
- v) Centre lines
- vi) Dimension lines
- vii) Guidelines
- viii) Title block

10.1.2P2 Printing letters and numbers

- i) Upper case
- ii) Lower case

10.1.3 PLANE GEOMETRY

10.1.3P0 *Specific objectives*

By the end of the sub-module unit the trainee should be able to:

- a) construct lines and angles
- b) construct plane geometric figures

Content

- 10.1.3P1 Straight lines
- 10.1.3P2 Common angles
- 10.1.3P3 Plane geometric figures

- i) Triangles
- ii) Quadrilaterals
- iii) Polygons
- iv) Circles

10.1.3C **Competence**

The trainee should have the ability to:

- i) Construct lines and angles
- ii) Divide a straight line into any number of equal parts
- iii) Construct plane figures

Suggested Learning Resources

- Drawing office
- Textbooks

10.1.4 BLENDING OF LINES AND ARCS

10.1.4P0 *Specific Objectives*

By the end of the sub-

module unit the trainee should be able to:

- a) blend straight lines and arcs
- b) determine the centre of an arc given its radius which blends with a line and a circle.
- c) find the centre of an arc of a given radius which blend with the two circles

10.1.4C **Competence**

The trainee should have the ability to:

- i) blend lines and curves
- ii) determine the centre of an arc
- iii) blend circles with arcs and other circles

Content

- 10.1.4P1 Straight lines
- 10.1.4P2 Arcs
- 10.1.4P3 Circles

Suggested Learning Resources

- Drawing offices
- Text books
- Drawing equipment

10.1.5 TANGENTS

10.1.5P0 *Specific Objectives*

By the end of the sub-module unit the trainee should be able to:

- d) construct a tangent to a circle
- e) construct a tangent to a circle from a

- f) point outside
construct a common tangent to two equal circles
- g) construct a common interior tangents to two equal circles
- h) construct a common external tangent to two unequal circles
- i) construct a common internal tangent between two un equal circles

10.1.5C Competence

The trainee should have the ability to:

- i) Draw a tangent to a circle
- ii) Draw common internal and external tangents two circles

Content

- 10.1.5P1 Circles and tangents
- 10.1.5P2 Common tangents
- 10.1.5P3 External and Internal tangents

Suggested Learning Resources

- Drawing offices
- Text books
- Drawing equipment

10.1.6 PICTORIAL & ORTHOGRAPHIC PROJECTIONS

- 10.1.6P0 *Specific Objectives*
By the end of the sub-module unit the trainee

should be able to:

- a) identify two types of projection
- b) construct objects in isometric and oblique projection
- c) convert pictorial to orthographic and vice versa
- d) dimension the drawing correctly

10.1.6C

Competence

The trainee should have the ability to:

- i) construct pictorial views in isometric and oblique projections
- ii) change pictorial drawings into orthographic and vice versa
- iii) dimension a given drawing

Content

- 10.1.6P1 Identification of types of projection
 - i) First-angle
 - ii) Third-angle projections
- 10.1.6P2 Pictorial drawings
 - i) Isometric projections
 - ii) Oblique projections
 - iii) Cabinet
 - iv) Cavalier
- 10.1.6P3 Pictorial and Orthographic
- 10.1.6P4 Dimensioning
Rules for dimensioning drawing

Suggested Learning Resources

- Textbooks
- Models
- Drawing equipment

- plane
- iv) True shape of a lamina

- 10.1.7T2 True length of a line
- 10.1.7T3 Determination of angles between FVP and HP

10.1.7 LINES IN SPACE

10.1.7P0 *Specific Objectives*

By the end of the sub-module unit the trainee should be able to:

- a) draw the projection of a line not parallel to any of the principal planes
- b) find the true length of a line not parallel to any of the principal planes
- c) determine the angle made between the line and the front vertical plane (FVP) and the horizontal plane.(H.P)

Suggested Learning Resources

- i) Text books
- ii) Models

10.1.8 SOLID GEOMETRY

10.1.8P0 *Specific Objectives*

By the end of the sub-module unit the trainee should be able to:

- a) construct geometric solids
- b) develop different type of solids
- c) draw the development of intersecting objects
- d) draw auxiliary views

10.1.7C Competence

The trainee should have the ability to draw the true shape of projection lines.

Content

10.1.7T1 Non Principal Planes

- i) True length
- ii) Traces of the straight line given the Plan and elevation.
- iii) True angle between the VP and the oblique

10.1.8C *Competence*

The trainee should have the ability to:

- i) construct various solid figures
- ii) draw surface development of truncated figures
- iii) draw Auxiliary views

Content

10.1.8P1 Solid figures

- Cylinders
- i) Cones
- ii) Pyramids

10.1.8P2 Surface development of solid figures

- i) Box
- ii) Cylinder
- iii) Pyramid
- iv) Cone

10.1.8P3 Intersection of Geometrical objects

- i) Lines of intersection
- ii) Curves of intersection

10.1.8P4 Auxiliary views

- i) Auxiliary views of truncated objects
- ii) True shape of the cut portion

Suggested Learning Resources

- Drawing office
- Textbooks
- Models
- Internet
- Drawing equipment

10.1.9 CONIC SECTIONS

10.1.9P0 *Specific objectives*

By the end of the sub-module unit the trainee should be able to:

- a) draw an ellipse using various methods
- b) parabola using various methods
- c) hyperbola using various methods

Content

10.1.9P1 Ellipse

- i) Focus
- ii) Minor axis
- iii) Major axis
- iv) Directrix

v) Vertex

10.1.9P2 Parabola

- i) Focus
- ii) Directrix
- iii) Eccentricity

10.1.9P3 Hyperbolas

- i) Focus
- ii) Directrix
- iii) Eccentricity

Suggested learning resources

- i) Textbooks
- ii) drawing office
- iii) Models

10.1.10 LOCI AND MECHANISMS

10.1.10P0

Specific

Objectives

By the end of the sub-module unit the

trainee should be able:

- a) define the locus of a point
- b) draw the locus of a point in relation to a circle
- c) draw the locus of a point for a given mechanism
- d) draw the locus of rigid link mechanisms

10.1.10C *Competence*

The trainee should have the ability to design link mechanisms for engineering components.

Content

- 10.1.10P1 Definition of a locus of a point
- 10.1.10P2 Loci of plane figures
 - i) Circle
 - ii) Ellipse
 - iii) Parabola
- 10.1.10P3 Loci of given mechanisms
- 10.1.10P4 Loci of rigid link mechanisms
 - iv) The sliding ladder
 - v) The piston-crank and connecting rod link
 - vi) The four bar link

Suggested Learning Resources

- i) Piston-crank and connecting rod model
- ii) Textbooks
- iii) The internet
- iv) Drawing equipment

easytvet.com

