15.2.0 PLANT DRAWING

15.2.1 Introduction

The areas covered in this unit are; applied geometry, assembly and plant drawing. It is expected that trainee will communicate ideas within the plant engineering field and correctly interpret drawings. Throughout the course, emphasis will be given to accuracy, neatness and good line work as this habit will influence accuracy in setting out practical tasks in selected fields. The international standards and conventions will be used throughout the subject.

15.2.2 General Objectives

By the end of this module unit, the trainee will be able to:

a) communicate ideas through the use of sketches and scaled drawings
b) read and interpret working drawings
c) set out practical work from a given sketch or scaled working drawings
d) accommodate new technological changes in drawings.

15.2.3 Summary Table and Time Allocation

PLANT DRAWING

Code	Sub-Module Unit	Content	Time (Hrs)
15.2.01	Plane Geometry II	• Construction of loci • Construction of helices • Lines in space and lamina • Blending of lines and curves • Tangent to circles	12
15.2.02	Solid Geometry	• Surface development of solids • Interpenetration of solids • Surface development of intersecting solids	12
15.2.03	Mechanical Fasteners and Locking devices	• Screw thread forms • Fasteners • Locking devices	10
15.2.04	Mechanical Engineering Drawing II	• Orthographic views of assembled drawings	10

Code	Sub-Module Unit	Content	Time (Hrs)
		• Sectional views of assembly drawings • Dimensioning assembly drawings • Assembly of exploded machine parts • Parts lists	
15.2.05	Plant Drawing	• Common plant components • Plant layout and services	11
15.2.06	Introduction to CAD (Computer Aided Drawing)	• Computer graphics • CAD equipment • CAD materials • Geometrical constructions and object drawing using CAD	11
Total Time			**66**

15.2.01 PLANE GEOMETRY II

Practice

15.2.01P *Specific Objectives*

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

a) construct locus of a point
b) construct a helix given the dimensions
c) determine the true length of lines in space and lamina
d) blend lines and curves
e) construct tangents to circles

15.2.01C Competence

The trainee should have the ability to:

i) draw loci of given mechanisms
ii) draw helices
iii) blend lines and curves
iv) draw tangents to circles

Content

15.2.01P1 Construction of loci
- i) sliding and rotating mechanisms
- ii) cycloid and epicycloids

15.2.01P2 Construction of helices
- i) single line cylindrical helix
- ii) double line cylindrical helix

15.2.01P3 Lines in space and lamina
- i) planes
- ii) projection of points and lines
- iii) true length of lines
- iv) true shapes

15.2.01P4 Blending of lines and curves
- i) straight lines and curves
- ii) circles with arcs
- iii) centre of an arc

15.2.01P5 Tangent to circles
- i) tangents to a circle from a point
- ii) internal/external tangents to circles

Suggested Teaching/ Learning Resources

- overhead projector
- models of mechanisms
- transparencies
- charts
- drawing instruments

15.2.02 SOLID GEOMETRY

Practice

15.2.02P *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
a) develop surfaces of solids
b) project the line of intersecting solids
c) develop surfaces of intersecting solids

15.2.02C Competence
The trainee should have the ability to:
i) draw surface development of objects
ii) draw interpenetrating objects

Content

15.2.02P1 Surface development of solids
i) prism
ii) cylinder
iii) pyramid
iv) cone

15.2.02P2 Interpenetration of solids
i) cylinder to cylinder
ii) cylinder to cone
iii) cylinder to pyramid
iv) cylinder to prism
v) cone to cone

15.2.02P3 Surface development of intersecting solids
i) development of cylinder to cylinder
ii) development of cylinder to cone
iii) development of cylinder to prism
iv) development of cone to cone

Suggested Teaching/ Learning Resources
- Drawing instruments and equipment
- Cylindrical and conical models
- Transparencies
- Overhead projector and slides

15.2.03 MECHANICAL FASTENERS AND LOCKING DEVICES

Practice

15.2.03P *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
a) draw different types of screw thread forms
b) draw different types of fasteners
c) draw different types of locking devices

15.2.03C **Competence**

The trainee should have the ability to:

i) draw different types of thread forms

ii) draw different types of fasteners and locking devices

Content

15.2.03P1 Screw thread forms

i) metric thread
ii) square thread
iii) buttress thread
iv) ACME thread

15.2.03P2 Fasteners

i) bolts/nuts
ii) rivets
iii) pins
iv) clips
v) washers
vi) screws

15.2.03P3 Locking devices

i) lock units
ii) circlips
iii) split pins

Suggested Teaching/Learning Resources

- Various fasteners and locking devices
- Drawing instruments

15.2.04 **MECHANICAL ENGINEERING DRAWING II**

Practice

15.2.04P *Specific Objectives*

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

a) Draw orthographic views of assembly drawings
b) draw sectional views of assembly drawings
c) dimension assembly drawings
d) assemble exploded machine parts
e) prepare parts list

15.2.04C **Competence**

The trainee should have the ability to draw assembly drawings

Content

15.2.04P1 Orthographic views of assembly drawings

15.2.04P2 Sectional views of assembly drawings

i) cutting plane
ii) hatching
iii) sectional views

15.2.04P3 Dimensioning assembly drawings

i) rules of dimensioning
ii) balloon referencing

15.2.04P4 Assembly of exploded machine parts
i) clapper box
ii) tail stock
iii) carburettor

15.2.04P5 Parts list

Suggested Teaching/Learning Resources
- drawing instruments and equipment
- samples of machine parts
- overhead projector/slides
- transparencies

15.2.05 PLANT DRAWING

Practice

15.2.05P *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
a) draw common plant components
b) draw plant systems, layout and services

15.2.05C Competence
The trainee should have the ability to:
i) draw plant components
ii) draw plant systems with the necessary services

Content

15.2.05P1 Common plant components
i) valves
ii) filters
iii) steam traps
iv) steam separator
v) power transmission elements

15.2.05P2 Plant layout and services
i) graphical symbols
ii) colour coding
iii) various plant systems

Suggested Teaching/Learning Resources
- different types of plant components
- holding down bolts
- plant system charts
- the British Standards for colour coding

15.2.06 INTRODUCTION TO COMPUTER AIDED DRAWING (CAD)

Practice

15.2.06P *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
a) explain computer graphics with reference to drawing
b) name various CAD equipment

c) name various CAD application software
d) explain the use of different CAD materials
e) prepare paper layout for CAD application
f) draw geometrical constructions and objects using CAD application

15.2.06C **Competence**

The trainee should have the ability to:

i) explain computer graphics with reference to drawing name various CAD equipment
ii) use different CAD materials
iii) produce geometrical constructions and object drawings using CAD equipment

Content

15.2.06P1 Computer graphics
straight line colour animation

15.2.06P2 CAD equipment
i) monitor
ii) input devices
iii) storage
iv) software

15.2.06P3 CAD application software
i) AutoCAD
ii) ArchiCAD
iii) Inventor

15.2.06P4 CAD materials
i) drawing media
ii) drawing pens
iii) storage media
iv) hard disks
v) flash disk
vi) optical disc

15.2.06P5 Laying out paper for CAD application
i) launching the CAD application
ii) setting the scale
iii) setting the paper size

15.2.06P6 Geometrical constructions and object drawing using CAD
i) circle
ii) ellipse
iii) polygon
iv) rectangle
v) tangents
vi) 3D
vii) spline
viii) auxiliary views
ix) sectional views

Suggested Learning Resources

- Computers
- CAD software
  - AutoCAD
  - ArchCAD
  - Inventor
- Printers
- Realias