7.1.0 TECHNICAL DRAWING

7.1.1 Introduction

The module unit comprises of applied geometry, design and working drawing. It is a support subject for all technical craft courses. It is expected that trainee will communicate ideas within a selected 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.

7.1.2 General Objectives

By the end of the 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) use new technological changes in drawings.

7.1.3 Module Unit Summary and Time Allocation

Code	Sub-Module Unit	Content	Time (Hrs)
7.1.01	General Communication	• Drawing instruments and equipment • Drawing materials • Drawing lines • Paper layout • Printing • Drawing conventions	7
7.1.02	Plane Geometry I	• Geometrical constructions • Construction of	20

		scales • Enlargement and reduction of plane figures • Conversion of areas • Construction of an ellipse • Construction of a parabola • Construction of a hyperbola	
7.1.03	Orthographic Projection	• Forms of projections (1st and 3rd angle projections) • Conversion of pictorial views to orthographic projections • Sectional views of given pictorial drawings	22
7.1.04	Pictorial Drawings	• Construction of isometric drawing of solids • Construction of Oblique drawings • Conversion of orthographic views into pictorial drawings • Use of grid paper	16
7.1.05	Free Hand Sketching	• Sketching techniques • Pictorial sketching	12

		of three dimensional drawings	
7.1.06	Mechanical Engineering Drawings I	• Working drawings of components • Conventional representations • Tolerances and machining symbols	22
Total Time			**99**

7.1.01 GENERAL COMMUNICATION

Practice

7.1.01P *Specific Objectives*

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

a) identify various drawing instruments and equipment
b) identify various drawing materials
c) select various types of lines for particular application
d) lay out a drawing paper
e) carry out printing
f) interpret various drawing conventions

7.1.01C Competence

The trainee should have the ability to:

i) use drawing instruments and materials for a particular application
ii) interpret various drawing convention

Content

7.1.01P1 Drawing instruments and equipment

i) set square
ii) protractor
iii) pair of compasses
iv) erasing shield
v) French curves
vi) tee square
vii) drawing board
viii) rule
ix) drafting machine(s)

7.1.01P2 Drawing materials

i) papers (A0, A1, A2, A3)
ii) erasers
iii) pencils (different grades)
iv) masking tapes
v) grid papers

7.1.01P3 Drawing lines

i) outlines
ii) centre
iii) construction
iv) dimension
v) hidden detail
vi) cutting plane
vii) projection
viii) section or hatching
ix) irregular/broken

7.1.01P4 Paper layout

i) title block
ii) border line
iii) centering drawing

7.1.01P5 Printing

i) lettering/numbering
ii) upper case/lower case
iii) slanting/vertical

7.1.01P6 Drawing conventions

i) Abbreviations and symbols

Suggested Teaching/Learning Resources

i) drawing instruments and equipment
ii) drawing materials

7.1.02 PLANE GEOMETRY I

Practice

7.1.02P *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to;

a) construct various plane figures using geometrical constructions
b) construct different scales
c) enlarge or reduce different figures
d) convert different shapes of equal areas
e) construct an ellipse
f) construct a parabola
g) construct a hyperbola

7.1.02C Competence
The trainee should have the ability to draw plane figures at a given scale

Content

7.1.02P1 Geometrical constructions
i) triangles
ii) quadrilateral
iii) polygons

7.1.02P2 Construction of scales
i) plain
ii) diagonal

7.1.02P3 Enlargement/reduction of plane figures

7.1.02P4 Conversion of areas
i) triangle to rectangle
ii) rectangle to square
iii) polygon to square

7.1.02P5 Construction of an ellipse
i) concentric circle method
ii) rectangular method
iii) foci method
iv) Trammel method

7.1.02P6 Construction of a parabola
i) transverse axis method
ii) radial intersecting method
iii) directrix method

7.1.02P7 Construction of a hyperbola
i) Transverse axis method

Suggested Teaching/Learning Resources
- Realia (instruments and equipment)
- Video
- Slides (overhead projector)

7.1.03 ORTHOGRAPHIC PROJECTION

Practice

7.1.03P *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:

a) draw given objects in 1st and 3rd angle projections
b) convert given pictorial drawings

into orthographic drawings
c) draw sectional views of given pictorial drawings

7.1.03C **Competence**
The trainee should have the ability to:
i) draw objects in 1st and 3rd angle projection
ii) use orthographic projection to interpret pictorial drawing

Content

7.1.03P1 First and third angle projection
i) orientation of views
ii) front elevation
iii) plan
iv) end view
v) sectional views

7.1.03P2 Conversion of pictorial drawing into orthographic
i) isometric views with inclined views, curves and circles
ii) oblique views with inclined sides, curves and circles

7.1.03P3 Sectional views of given pictorial drawings
i) Cutting plane
ii) Hatching
iii) Sectional views

Suggested Teaching/Learning Resources
i) Drawing instruments and equipment
ii) Models
iii) Charts
iv) Overhead projector
v) Slides

7.1.04 PICTORIAL DRAWINGS

Practice

7.1.04P *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to;
a) construct isometric drawings of given solids
b) construct oblique drawings of given solids
c) convert orthographic views into pictorial drawings
d) use grid paper to make pictorial drawings

7.1.04C **Competence**
The trainee should have the ability to produce pictorial drawings

Content

7.1.04P1 Construction of isometric drawings of solids
i) curves
ii) circles
iii) inclined surfaces

7.1.04P2 Construction of oblique drawings of solids
- i) curves
- ii) circles
- iii) inclined surfaces

7.1.04P3 Conversion of orthographic views into pictorial drawings

7.1.04P4 Use of grid paper
- i) isometric
- ii) oblique

Suggested Teaching/Learning Resources
- i) drawing instruments and equipment
- ii) charts, drawing materials (e.g. grid paper, drawing paper)

7.1.05 FREEHAND SKETCHING

Practice

7.1.05P *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to;
- a) use sketching techniques for freehand sketching
- b) produce pictorial-sketches

7.1.05C Competence
The trainee should have the ability to sketch objects using free hand

Content

7.1.05P1 Sketching techniques
- i) construction lines
- ii) "box-in" method
- iii) block-on block method

7.1.05P2 Pictorial sketching of three-dimensional drawings
- i) hand tools
- ii) blocks
- iii) assembled objects

Suggested Teaching/Learning Resources
- i) overhead projector
- ii) drawing models
- iii) grid paper
- i) drawing instruments and equipment

7.1.06 MECHANICAL ENGINEERING DRAWING

Practice

7.1.06P *Specific Objectives*
By the end of the sub-module unit, the trainee should be able to:
- a) produce a working drawing of a given component
- b) draw different kinds of engineering conventions
- c) select the correct tolerances and machining symbols for a given drawing

7.1.06C **Competence**

The trainee should have the ability to produce a working drawing of given components using BS 4500A chart and machine symbols

Content

7.1.06P1 Working drawings of components

7.1.06P2 Conventional representations

i) welds
ii) bolts and nuts
iii) gears
iv) rivets
v) abbreviation
vi) thread and hole
vii) splined shaft
viii) serrated shaft
ix) diamond knurling
x) square on shaft
xi) bearing
xii) limits and fits

7.1.06P3 Tolerances and machining symbols -ISO fits (BS4500A)

i) clearance fit
ii) transitional fit
iii) interference fit

Suggested Teaching/Learning Resources

- BS4500Achart
- drawing instruments and equipment
- projectors
- Transparencies