TECHNICAL DRAWING

13.01 INTRODUCTION

This subject is expected to equip the trainee with knowledge and skills so as to be able to communicate read and interpret simple working drawings correctly.

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 the trainee's area of specialization.

13.02 The international organization of standardization (SI Units and convertions) will be used throughout the subject.

13.03 GENERAL OBJECTIVES

At the end of this course unit, the trainee should be able to

a) produce drawings in isometric, orthographic, oblique, axonometric and perspective projections.

b) produce free hand sketches as used in building construction.

c) interpret common working drawings for building construction tasks.

TECHNICAL DRAWING

STAGE ONE COURSE UNIT SUMMARY - TIME 44 HOURS

CODE	TOPIC	SUB-TOPIC	TIME
13.1.1.S	GENERAL COMMUNICATION	- Introduction - Further work on use and care of instruments - Correct paper layout, sizes and folding - Quality of lines and lettering - Techniques on dimensioning - Construction to scales	8
13.1.2.S	PLANE GEOMETRY	- Construction of scales - Enlargement and reflection of figures - Conversion of areas - Ellipse - Parabola - Hyperbola - Loci	19
13.1.3.S	ORTHOGRAPHIC PROJECTION	- Further work on first and third angle projection - Conversion of pictorial views to orthographic projections	6
13.1.4.S	PICTORIAL DRAWING	- Isometric drawing involving curves and circles - Oblique drawings involving curves and circles	4
13.1.5.S	SOLID GEOMETRY	- Solid sections - Auxiliary projection	4
13.1.6.S	FREEHAND SKETCHING	- Sketching techniques - Pictorial sketching (three dimensional drawings)	2
13.1.7.S	WORKING DRAWINGS FOR BUILDING	- Material symbols - Foundation details - Floor details	8

STAGE ONE TIME 44 HOURS

1.1.5 GENERAL COMMUNICATION 8 HOURS

13.1.1.5.1 Specific Objectives

At the end of this topic the trainee should be able to:-

a) state the role of drawing as a means of communication
b) use and care for a given drawing instrument
c) demonstrate the correct procedure of laying out and folding drawing paper
d) draw and print quality lines and letters
e) dimension a given drawing
f) draw to a given scale

13.1.1.5.11 Introduction

(i) Artistic drawing
(ii) Sketches
(iii) Scaled drawing
(iv) Site plans

13.1.1.5.12 Further work on care and use of instruments

(i) Clutch pencils
(ii) Drafting machines
(iii) Tracing papers
(iv) Blue print papers
(v) Printing ink

13.1.1.5.13 Correct paper layout, sizes and folding

(i) Centering drawing
(ii) Boarder lines
(iii) Title block
(iv) Paper sizes i.e. A4, A3, A1 & Ao
(v) Folding for filling

13.1.1.S.14 Quality of lines and lettering

(i) Types of lines
(ii) Choice of leads
(iii) Upper case
(iv) Lower case

13.1.1.S.15 Techniques on dimensioning

(i) Linear dimensioning
(ii) Angular dimensioning

13.1.1.S.16 Construction to scales

(i) Reproduction of given drawing to a given scale

1.2.5 PLANE GEOMETRY 12 HOURS

13.1.2.S.1 Specific Objectives

At the end of this topic, the trainee should be able to:

a) construct a pre-determined scale for a given task
b) reduce or enlarge figures by construction method
c) construct given figures to other shapes of equal area
d) construct an ellipse using intersecting arc method
e) construct a parabola from a given line and a fixed point.
f) Construct the loci of a point of sliding and rotating mechanism.

13.1.2.S.11 Construction of Scales

(i) Plane scale
(ii) Diagonal scale

13.1.2.S.12 Enlargement and Reduction of figures

(i) Radial method
(ii) Polar method

13.1.2.S.13 Conversion of Area
(i) Triangle to rectangle
(ii) Rectangle to square
(iii) Polygon to square

13.1.2.S.14 Ellipse
Foci method

13.1.2.S.15 Parabola
(i) Transverse axis method
(ii) Radial intersection method
(iii) Directrix method

13.1.2.S.16 Hyperbola
Transverse axis method

13.1.2.S.17 Construction of Loci
(i) Double crank mechanism
(ii) cycloid (iii) epicycloid

13.1.3S ORTHOGRAPHIC PROJECTION 6 HOURS

13.1.3.S.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) draw given objects in first and third angle
b) convert pictorial views into orthographic projections

13.1.3.S.11 Further work on first and third angle projection
(i) Front elevation
(ii) End view
(iii) Plan view

13.1.3.S.12 Conversion of pictorial views into orthographic
(i) Insometric views with inclined sides, curves and circles
(ii) Oblique views with inclined sides, curves and circles

1.4.5 PICTORIAL DRAWING

13.1.4.S.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) construct isometric drawings of solids having curves and circles

b) construct oblique drawings of solids having curves and circles.

13.1.4.T.11 Isometric drawings involving curves and circles

(i) Vee block

(ii) Bracket

1.5.S SOLID GEOMETRY 4 HOURS

13.1.5.S.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) draw the front elevation and plan of a sectioned solid

b) produce an auxilliary view from a given elevation and plan

13.1.5.S.11 Sections of solids

(i) Prisms

(ii) Pyramids

(iii) Cones

1.6.S FREEHAND SKETCHING 2 HOURS

13.1.6.S.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) draw construction lines and boxes for freehand sketching

b) use construction lines and boxes to produce pictorial sketches

13.1.6.S.11 Sketching Techniques

(i) Construction lines

(ii) 'Box-in' method

(iii) 'Box-on-block' method

13.1.6.S.12 Pictorial sketching (three dimensional drawing)

(i) Hand tools

(ii) Blocks

(iii) Assembled objects

13.1.7.T BUILDING WORKING DRAWING 8 HOURS

13.1.7.S.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) identify symbols for building materials

b) draw the details of a foundation and floor

13.1.7.S.11 Material symbols

Materials e.g.

(i) Pipe fitting

(ii) Valves

(iii) Stones

(iv) Blocks

(v) Timber

13.1.7.S.12 Foundation and floor details

(i) Foundations

- strip
- stepped
- raft (floating)

(ii) Floors

- timber
- concrete

STAGE TWO COURSE UNIT SUMMARY - TIME 22 HOURS

	TOPIC	SUB-TOPIC	TIME
3.2.1. S	PLANE GEOMETRY	- Helix - Lines in space and laminas	2
3.2.2. S	ORTHOGRAPHIC PROJECTION	- Orthographic views of assembled drawings - Assembly of exploded views unsectioned	6
3.2.3. S	PICTORIAL DRAWING	- Isometric drawings of objects having inclined sides	4
3.2.4. S	SOLID GEOMETRY	- Further work on surface development - Further work on interpenetration	6
3.2.5. S	DESIGN	- Principals of design - Design projection	4
3.2.6. S	PERSPECTIVE DRAWING	- Defination - One point projection - Two point projection	4
3.2.7. S	WORKING DRAWINGS FOR BUILDING	- Details of wall and openings - Roofs and trusses - Elevations and sections details	12

STAGE TWO TIME: 32 HOURS

13.2.1.S PLANE GEOMETRY 4 HOURS

13.2.1.S.1 Specific Objectives

At the end of this topic, the trainee should be able to:

[illegible]

(a) construct helix given dimensions
(b) determine the true length of lines in space and lamina

[illegible] crank [illegible]
(i) [illegible]
(ii) [illegible]
(iii) [illegible]

13.2.1.S.12 Construction of helix
(i) Single line cylindrical helix
(ii) Double line cylindrical helix

13.2.1.S.13 Lines in space and laminas
(i) Planes
(ii) Projection of points and lines
(iii) True length of lines
(iv) True shapes

13.2.2.T ORTHOGRAPHIC PROJECTION 6 HOURS

13.2.2.T.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) produce orthographic views of assembled drawing
b) assemble exploded views and draw in orthographic projection

13.2.2.T.11 Orthographic views of assembled drawing
Assembled pictorial drawings

13.2.2.S.12 Assembly of exploded views e.g.

(i) Doors and doorframes

(ii) Taps

(iii) Formwork for precast units

3.2.3.S PICTORIAL DRAWING 4 HOURS

13.2.3. S.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

construct isometric drawing of objects having inclined sides.

13.2.3.S.11 Isometric drawings of objects having inclined sides

Objects e.g.

Carpenters' stool or sawing trestle

3.2.4.S SOLID GEOMETRY 6 HOURS

13.2.4.S.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) project the points of intersecting solids

b) develop surfaces of intersecting solids

13.2.4.S.11 Further work on interpenetration

(i) Cylinder to cone

(ii) Cylinder to pyramid

(iii) Cylinder to triangular prism

(iv) Cone to cone (oil can)

13.2.4.S.12 Further work on surface development

(i) Individual development of cylinder to cone

(ii) Individual development of cylinder to pyramid

(iii) Individual development of cylinder to triangular prism

(iv) Individual development of cone to co
(oil can)

13.2.5.5 DESIGN 4 HOURS

13.2.5.5.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) state the principles of design
b) design simple and functional objects

13.2.5.5.11 Principles of design

(i) Proportionality (appearance)
(ii) Fitness for purpose
(iii) Durability
(iv) Design in relationship with the human body size

13.2.5.5.12 Design projects

Functional objects e.g.

(i) Paper punch
(ii) Stool
(iii) Arches
(iv) Sprinklers

13.2.6.5 PERSPECTIVE DRAWING 4 HOURS

13.2.6.5.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) explain the meaning of perspective drawing
b) draw objects using one point projection
c) draw objects using two point projection

13.2.6.5.11 Definition of perspective drawing

Definition

13.2.6.5.12 One point perspective

Objects e.g.

(i) Blocks

(ii) Buildings

(iii) Furniture

13.2.6.5.13 Two point perspective

Objects e.g.

(i) Blocks

(ii) Buildings

(iii) Furniture

3.2.7.5 BUILDING WORKING DRAWING 8 HOURS

13.2.7.5.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) draw the details of wall and openings

b) draw the details of roofs and trusses

c) draw floor plan of simple domestic house

d) construct the elevations of a building (simple domestic house)

13.2.7.5.11 Details of walls and wall openings

(i) Walls

(ii) Doors

(iii) Windows

13.2.7.5.12 Details of roofs and trusses

e.g.

(i) Flat roofs

(ii) Pitched roofs

(iii) Kingpost roof trusses

(iv) T.P.P.A. roof truss

13.2.7.5.13 Floor plans

Working drawings for a domestic house

...5.

13.2.7.5.14 Elevations and section details

(i) Front view

(ii) Rear view

(iii) Right end view

(iv) Left end view

(v) Section details (facade section)

STAGE THREE COURSE UNIT SUMMARY - 28 HOURS

CODE	TOPIC	SUB-TOPIC	TIME
13.3.1.5	DESIGN	- Simple and functional objects	8hrs
13.3.2.5	PERSPECTIVE DRAWING	- Two point projections	6 "
13.3.3.5	WORKING DRAWINGS	- Simple building drawings - Reading building drawing - Building structures	10 "

STAGE THREE - (22 HOURS)

13.3.1.S DESIGN (8 HOURS)

13.3.1.S.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

- Design simple and functional objects

13.3.1.S.11 Simple and functional objects

e.g.

(i) Hand tools
(ii) Furniture
(iii) Fire places
(iv) Window sill
(v) Form-work

13.3.2.S PERSPECTIVE DRAWING (4 HOURS)

13.3.2.S.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

- Draw objects using two point projection

13.3.2.S.11 Two point projection

e.g. Domestic buildings

13.3.3.S WORKING DRAWINGS (10 HOURS)

13.3.3.S.1 Specific Objectives

At the end of this topic, the trainee should be able to:-

a) draw simple building drawings
b) read simple building drawings
c) design simple building structures

13.3.3.5.11 Simple building drawings

e.g.

(i) Domestic working drawing

(ii) Classrooms

(iii) Workshop

13.3.3.5.12 Reading building drawings

e.g.

(i) Domestic working drawing

(ii) Classrooms

(iii) Workshop

13.3.3.5.13 Building structures

e.g.

(i) Stairs

(ii) Water systems

(iii) Drainage systems