COURSE DETAILS:

Course Coordinator: Dr. Olayanju T.M. Adeniyi, B.Sc., M.Sc. Ph.D
Email: olayanjutma@unaab.edu.ng
Office Location: Room G003, C VE Building, COLENG
Other Lecturers: None

COURSE CONTENT:


COURSE REQUIREMENTS:

This is a required course for all students in the Department of Food Science and Technology. In view of this, Students are expected to participate in all the course activities and have minimum of 75% attendance to be able to write the final examination.

READING LIST:

2. AutoCAD 2000 for Beginners POOlad Consult Ltd Abeokuta
1.0 INTRODUCTION

1.1 Drawing Instruments

A good and accurate drawing can only be made through constant practice with the aid of drawing instruments and materials listed below:-

- Drawing board
- Tee square
- Drawing pencils
- Set of drawing instruments
- Set squares 60°, 30° and 45°
- Drawing paper clips or tape
- Protractor
- Scale rule
- French curves
- Drawing paper
- Eraser
- Compasses and Divider

1.2 Title Block
### 1.3 Dimensioning

<table>
<thead>
<tr>
<th>Name</th>
<th>Matric Number</th>
<th>Title of Drawing</th>
<th>Drawing Number</th>
<th>Dimension</th>
<th>Scales/Symbol</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Title Block**

- **UNTRIMMED**
- **TRIMMED**
- **MARGIN**

**FOLDING MARK**

- 150mm
- 70mm

**Dimensions**

- 80mm
DIMENSIONING TECHNIQUES/RULES.

(i) Dimensions should be placed outside the outline of the view whenever possible.
(ii) Always ensure there is a small gap between the outline and the start of the projection line.
(iii) Projection line should continue a short distance beyond the dimension line.
(iv) The dimension line arrow heads must just touch the projection line. Arrow heads are about 3mm long at each end.
(v) Dimensions must never be cramped.
(vi) Smallest dimension should be placed nearest the outline to avoid dimension and projection lines crossing (Fig. 3.4)
1.4 Lines
## 1.5 Simple Geometry

<table>
<thead>
<tr>
<th>LINE</th>
<th>DESCRIPTION</th>
<th>GENERAL APPLICATIONS</th>
</tr>
</thead>
</table>
| A    | CONTINUOUS THICK | A1 VISIBLE OUTLINE  
|      |              | A2 VISIBLE EDGES    |
| B    | CONTINUOUS THIN STRAIGHT OR CURVED | B1 IMAGINARY LINES OF INTERSECTION  
|      |              | B2 DIMENSION LINES  
|      |              | B3 PROJECTION LINES |
|      |              | B4 LEADER LINES     |
|      |              | B5 HATCHING         |
|      |              | B6 OUTLINES OF REVOLVED SECTIONS IN PLACE |
|      |              | B7 SHORT CENTRE LINE |
| C    | CONTINUOUS THIN FEED AND CUT | C1 LIMITS OF PARTIAL OR INTERRUPTED VIEWS AND SECTIONS, IF THE LIMITS NOT A CHAIN THIN |
| D    | CONTINUOUS THIN STRAIGHT WITH ZIGZAGS | D1 LINE |
| E    | DASHED THICK | E1 HIDDEN OUTLINES  
| F    | DASHED THIN  | E2 HIDDEN EDGES     |
| G    | CHAIN THIN   | F1 HIDDEN OUTLINES  
|      |              | F2 HIDDEN EDGES     |
| H    | CHAIN THIN, THICK AT ENDS AND CHANGES OF DIRECTION | G1 CENTRE LINES  
|      |              | G2 LINES OF SYMMETRY |
|      |              | G3 TRAJECTORIES     |
| J    | CHAIN THICK  | H1 CUTTING PLANES   |
| K    | CHAIN THIN DOUBLE-DASHED | J1 INDICATION OF LINES OR SURFACES TO WHICH A SPECIAL REQUIREMENT APPLIES |
|      |              | K1 OUTLINES OR ADJACENT PARTS  
|      |              | K2 ALTERNATIVE AND EXTREME POSITIONS OF MOVABLE PARTS |
|      |              | K3 CENTROIDAL LINES  
|      |              | K4 INITIAL OUTLINES PRIOR TO FORMING  
|      |              | K5 PARTS SITUATED IN FRONT OF THE CUTTING PLANE |
To construct an Angle of $60^\circ$

**Procedure**
1. Draw a line $AB$.
2. Indicate point $C$ anywhere on $AB$.
3. With centre $C$ and any convenient radius draw an arc to cut $AB$ at $D$.
4. With centre $D$ and the same radius draw an arc to cut the previous arc at $E$.
5. Draw a line from $C$ through $E$ (line $CF$). $FCB$ is the required angle.

![Diagram](image-url)
To construct an Angle of 30° (See Fig. 4.2)

Procedure
i. Construct an angle of 60°, as in Fig. 4.1
ii. Bisect the 60° angle.
iii. Angle ABC is the required 30° angle.

Fig. 4.2

To construct an Angle of 15° (See Fig. 4.3)

Procedure
i. Construct an angle of 30°, as above
ii. Bisect the 30° angle.
iii. Angle 1, 2, 3 is the required 15° angle.

Fig. 4.3
To construct an Angle of $45^\circ$

Procedure
1. Construct a right angle $BAC$
2. Bisect the right angle to obtain a $45$ angle.

Fig. 4.4
Construction of angle $90^\circ$ using compasses
(Fig. 4.5)

Given:
(i) Let line $AB$ be a given line with point $C$ at which the right angle $90^\circ$ is to be drawn.
(ii) With centre $C$ and any convenient radius, draw the semi-circle touching the line $AB$ at $D$ and $E$.
(iii) With centres $D$ and $E$ and radius $DE$ draw two arcs which intersect at $F$. Join $F$ to $C$.
(iv) Angles $FCA$ and $FCB$ are each $90^\circ$.

(Fig. 4.5)
FIRST AND THIRD ANGLE PROJECTIONS

In first angle projection the object is placed in the first quadrant. The view obtained reveal that the elevation is above the plan upon revolving the horizontal plane about the line XY, which intersects the vertical and Horizontal planes, until both planes coincide (fig. 10.14). In the third angle projection, where the object it placed in the third quadrant, the plan is above the elevation.

We thus, see that when the same object is placed in the first and third quadrants the views obtained on projection are exactly the same, however, the relative position of the plan and elevation are different.

The views obtained and their relative positions when the same object is placed in both the first and fourth angles are the same, that is, they overlap. In the same vein, views obtained in the third and second angle overlap. It can therefore be seen why we speak of only first and third angle projections.
END VIEWS

In most cases the elevation and plan view do not fully describe the shape of an object. It therefore becomes, in such cases, mandatory that another view of the object be drawn for a good grasp of the complete shape of the object. This view, often referred to as end view or end elevation, can be obtained by the introduction of another plane of projection called an auxiliary Vertical plane (AVP), oriented perpendicularly to both the Vertical plane and horizontal plane.

The end view is either to the left or right of the elevation depending on the position of the Auxiliary vertical plane.
PROJECTION SYMBOLS

It is necessary to indicate on the drawing which system of projection has been used. This is done by a symbol consisting of an elevation and an end view of a frustrum of a cone.

The first and third angle symbols are shown in Fig 10.16.
POINTS TO NOTE IN ORTHOGRAPHIC PROJECTION

i. Enough space should be left between the views on a drawing to accommodate dimension and notes without crowding.

ii. The spacing should be planned before beginning.

iii. Hidden detail should only be used where it is essential for a complete description of the object but it should not be used for dimensioning.

iv. Avoid completing the view separately since it wastes time. Measurements can often be made on two or more views simultaneously or projected from one to another as soon as they are made therefore build all the views together.
Orthographic projection

Look in this direction to see plan

Look in this direction to see end view
The two working drawings on this page and on page 47 opposite show different views of the same component. The drawing on page 47 shows an end view on the right of the front view. That on this page shows an end view on the left of the front view. Both are quite correct.

Rules for First Angle projection

*Note*: The following details shown in the two working drawings should be noted —

1. In First Angle projection, the PLAN is below the FRONT VIEW.
2. In First Angle projection the END VIEW on the right of the FRONT VIEW is the view as
seen when looking at the left of the front view.

In First Angle projection the END VIEW on the left of the FRONT VIEW is the view as seen when looking at the right on the front view.

In First Angle projection the PLAN always faces outwards from the FRONT VIEW. The lines of the front of the plan face towards the sheet margins.

In First Angle projection END VIEWS always face outwards from the FRONT VIEW. The lines of the fronts of end views face towards the sheet margins.
Part No. ZH3Y75

Dimensions in millimetres

- HOLE ø8 W4.5 ø4.0
- Machined All Over
- Tolerance ±0.4 mm

G.H. RINGWOOD & SONS LTD

<table>
<thead>
<tr>
<th>Drawn</th>
<th>Check</th>
<th>Mod</th>
<th>Check</th>
<th>Scale</th>
<th>Part No. ZH3Y75</th>
</tr>
</thead>
<tbody>
<tr>
<td>AV</td>
<td>AV</td>
<td>AV</td>
<td>AV</td>
<td>1:1</td>
<td></td>
</tr>
</tbody>
</table>

25th September 83
Part No. ZH3Y75

Dimensions in millimetres

<table>
<thead>
<tr>
<th>Drawn</th>
<th>Check</th>
<th>MACHINE ALL OVER TOLERANCE ±0.4 mm</th>
<th>G. H. RINGWOOD &amp; SONS LTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>AY</td>
<td>ACO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HOLE 08 WAS 010</td>
<td>Mod</td>
<td>AY</td>
<td></td>
</tr>
<tr>
<td>Modifications</td>
<td>Check</td>
<td>ACO</td>
<td>SCALE 1:1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

30 18 21 40 38 10 8 8

Projection
After setting up the sheet of drawing paper on a drawing board:

Draw parallel lines with the aid of a tee square and vertical lines with the aid of a set square to produce the outlines of a front view, an end view and a plan. The three rectangles required are: front view — 60 mm by 30 mm; end view — 50 mm by 30 mm; plan — 60 mm by 50 mm. Draw these outlines with a sharpened pencil in very thin, fine lines which can be easily removed with a rubber eraser.

Measure the distance between the front view and the plan. Mark this distance off from the left hand of the end view outline to give AB. Draw a vertical through AB with the aid of a set square. A compass centred at B and set to AB should produce the arc AC with C in line with the upper edge of the plan outline.

Fill in details within the end view outline.
Fill in details within the end view outline with fine construction lines. With compass centred at B swing these lines through to meet the vertical line through B to give points 1, 2, 3, 4 and 5.

Project lines 1, 2, 3, 4 and 5 across the plan outline with the aid of a tee square. Complete filling in details of the plan to obtain the hole, its centre lines and the length of the slot.

Fill in details in the front view outline by projecting from the end view and the plan. Line-in all required details in the three views with a sharp pencil. Outline lines should be thick black lines. Centre and hidden detail lines should be thin black lines. Erase unwanted construction lines. Add the symbol of projection.
Lay out overall sizes of front view, end view, and plan in constructed lines.

Plot position of compass centre for projecting end view into plan.
Construct end view and project points from the end view into the plan.
Project detail from end view and plan into the front view

Line-in, add symbol of projection
Sketch the following views of the given objects:

a. Elevation in direction of arrow T.

b. End view in direction of arrow S.

c. Elevation view projected from view (a).

(Use first and third angle projection for objects, shown on Fig. 1-5)
3.0 ISOMETRIC PROJECTIONS
Nine Stages in the Construction of the Isometric Box

Fig 2.3 shows the isometric box with its overall measurements. In all cases in this book, the isometric box will be 100x64x50mm.

The first thing to remember, is that every time you draw this box, you must draw your lines as thin as possible. The box is only a guide, the actual shape will be very different from the box. Construction lines should be as thin as possible, only you should be able to see them. Observe the various stages very carefully.

You can practice this box on any scrap of paper big enough, only when you are certain of its construction should you attempt the first drawing in Classwork 1. The following lines will be required in the work to be covered in all drawings in this book.
Fig 2.3  This is the isometric box on which all drawings' isometric are based.
Fig 2.5(a) Draw the vertical line from the starting point and make this line 50mm long.

Fig 2.5(b) Draw this line with your 30° set-square and make this line 100mm long.
Fig 2.5(c) Draw this line with the 30° set-square and make this line 64mm long.

Fig 2.5(d) From the end of 2, draw line 4 with the vertical side of the set-square and make this line slightly longer than 50mm.

After Fig 2.5(d) you do not need the ruler anymore, the set-square will finish the job for you.
Fig 2.5(e) Draw 5 from the end of 3 and make this line slightly longer than 50mm.

Fig 2.5(f) Draw 6 from the top of 1 to intersect 4.
Fig 2.5(g) Draw 7 from the top of 1 to intersect 5.

Fig 2.5(h) Draw 8 from the top of 5 and make this line slightly longer than 100mm.
Draw 9 from the top of 4 to intersect 8. This completes the box. The next three lines are hidden, they are therefore drawn as broken lines.

Fig 2.5(j)
Classwork 1

Third Angle Projection

Fig 3.2
Classwork 1

First Angle Projection

Fig. 39

All dimensions in millimetres

http://www.unaab.edu.ng
Federal University of Agriculture, Abeokuta
UNIVERSITY OF AGRICULTURE, ABEOKUTA
University Examinations - Second Semester 2009/2010 Session
COLLEGE OF ENGINEERING; DEPARTMENT OF AGRICULTURAL ENGINEERING
Course Title: **AGE 224** - Technical Drawing II (2 Units)
Instructions: **Answer Question 1 and any other two.**

Time Allowed: **2 Hours**   All dimensions are in mm.

**QUESTION 1**
Produce the Isometric Drawing of the three – views of a bracket shown in Figure 1.

![Figure 1](http://www.unaab.edu.ng)

**QUESTION 2**
Using Third Angle Projection, draw three views of the object in Figure 2 as orthographic.

![Figure 2](http://www.unaab.edu.ng)

**QUESTION 3**
Using the shortest seam, produce full size pattern of the object in Figure 3.
QUESTION 4

Draw, **FREEHAND**, on plain unlined drawing paper, the orthographic views in First angle projection of the structure in Figure 4.

Figure 4
QUESTION 5
Construct an ellipse in which the major axis AB is 100mm and the minor axis CD is 50mm