The TVET First NATED Series offers students and lecturers a wide range of courses, written by lecturers, examiners and subject experts. Troupant/Macmillan have developed brand new books that cover the curriculum and that address developments in the various fields by bringing subject matter up to date. The books include:

• relevant and attractive illustrations
• activities
• examples
• new word definitions.
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LEARNING OUTCOMES
On completion of this module you should be able to:

Unit 1: Identify and correctly use the abbreviations for the following terms used in Engineering Drawing:

- Centres
- Cylinder and cylindrical
- Diameter
- Outside diameter
- Hexagon
- Maximum
- Millimetre

- Centre line
- Degree (of angle)
- Internal diameter
- Drawing
- Material
- Metre
- Radius

Unit 2: Give the basic function of the following hardware and software as used in Computer Aided Design (CAD):

- DOS (Disk operating system)
- Keyboard
- Tablet
- CPU (central processing unit)
- ROM (read only memory)
- Hard drive/fixed disk
- Floppy disk
- Stiffy disk
- Directory

- Sub-directory
- Files
- CAD (computer aided draughting)
- Mouse
- Scanner
- RAM (random access memory)
- Monitor
- CD ROM (compact disk, read only memory)
- Plotter/printer

The weight value for this module should be allocated as 5% and the approximate time allocated during the course is 3 hours 45 minutes.

INTRODUCTION
What is engineering drawing? For one thing, it is an effective means of communicating technical ideas and problem solutions. Look at what happens in engineering design. The process starts with the ability to visualize, seeing the problem and the possible solutions. Then, sketches are made to record initial ideas.

Next, geometrical models are created from those sketches and are used for analysis. Finally, detail drawings or three-dimensional models are made to record the precise data needed for the production process. Visualizing, sketching, modelling, and detailing are how engineers and technologists communicate as they design new products and structures for our technological world.

Actually, communication using engineering drawings and models is a language, a clear, precise language with definite rules that must be mastered if you are to be successful in engineering design. Once you know the language, it will influence the way you think, the way you approach problems.

Universally accepted, conventional and standardized methods of communication through engineering drawings are used. This is so that any designers here, and in other countries, will be able to ‘read’ and interpret each other’s drawings in exactly the same way.

Components (machine parts) shown in a drawing can therefore be made by suitably skilled craftsmen of any nationality, provided they can ‘read’ an engineering drawing. If the drawings are correctly drawn and annotated (described) by means of notes, dimensions, etc., the finished product will be exactly as visualized by the designer. Any misunderstandings when describing shapes and size by using only words and no drawings are thus avoided.
UNIT 1: TERMS USED IN ENGINEERING DRAWING

Centres
Abbreviation: CRS

Centre line
Abbreviation: CL

Cylinder and cylindrical
Abbreviation: CYL
Hexagon
Abbreviation: HEX
A hexagon is a polygon of six sides of the same length and six internal angles all of 120° (120°).

Activity
Give the abbreviations for the following: centre line, internal diameter, centres, material, drawing and radius.

UNIT 2: BASIC COMPUTERS, STORAGE DEVICES AND TERMS ASSOCIATED WITH COMPUTER AIDED DRAUGHTING (CAD)
Candidate's information box
The candidate’s information, including the examination number, must appear in the information box. All the information must be filled in in pencil.

<table>
<thead>
<tr>
<th>THE COLLEGE NAME</th>
<th>Grade</th>
<th>Subject</th>
<th>Centre No</th>
<th>Date</th>
<th>Exam.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAMINATION NUMBER</td>
<td></td>
<td></td>
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<td></td>
<td>start time</td>
</tr>
</tbody>
</table>

Your examination number is normally your Identity Document number.

Border
A 15 mm border (unless otherwise stated by the examiner) must be drawn on both sides of the sheet.

Balanced layout
Before you start the examination, read all the questions carefully and be sure you understand what is required. Only one drawing sheet is issued to candidates. It is very important, therefore, that candidates plan the layout of their work before commencing. Make sure that all the drawings will fit on the sheet. It is not required that Question 1 be on the same side of the drawing sheet as Question 2. The question numbers must be clearly indicated.
Special sectioning conventions

Ribs, webs, spokes, lugs, gear teeth, and other thin features are not section-lined when the cutting plane passes parallel to the feature. A rib or web is a thin flat part that acts as a support. When you add section lines to these features it gives a false impression that the part is thicker than it really is.

The figure below shows a cutting plane that passes parallel to and through a web (section B - B). The figure marked (A) shows an incorrect representation of the section view, with the web having section lines. This view gives the false impression that the web has substantial thickness. The figure marked (B) shows the view drawn using conventional practice, leaving the web unsectioned, which is the correct way. If the cutting plane passes perpendicular or crosswise to the feature (cutting plane A - A), section lines are added as shown in the figure marked (C).

Notes

- Section lines are drawn thin (0.35 mm), black, uniform and uniformly spaced.
- Section lines are drawn at 45° to the horizontal when possible.
- Section lines are not drawn parallel or perpendicular to the visible outline of the sectioned surface.
- Section lines do not extend beyond or stop short of the outline of the sectioned surface.
- Very thin parts are not shown with section lines.
UNIT 1: CREATING AN ORTHOGRAPHIC PROJECTION OF PRISMS AND PYRAMIDS

Example 1
The figure shows a front view and an auxiliary view of a rectangular square prism inclined at 45°. Copy the given views and project a top view as seen in the direction of arrow Y and a left view as seen in the direction of arrow X.

Solution 1
Step 1: Draw the auxiliary view as per the given measurements.
Step 2: Project the front view from the auxiliary view.
Step 3: Draw the lines X-X and Y-Y.
Step 4: At the intersection of X-X and Y-Y draw a line OZ at 45°.
Step 5: From the front view, the left view and the top view are projected as shown by the arrows. It is clear that measurements 4, 3, 5 and 8 on the auxiliary view are equal to 1, 2, 3 and 4 on the top view and the left view.

Alternative method of creating an orthographic projection of prisms and pyramids

Solution 1
An alternative, and maybe an easier, method is shown below:
Step 1: Draw the auxiliary view to the correct dimensions and scale.
Step 2: Project the front view from the auxiliary view.
Step 3: In between the auxiliary view and the front view draw line ZZ perpendicular to the front view angle. Draw the line anywhere in between.
Step 4: From the front view, the left view and the top view, lines are projected across and downwards.
Step 5: Measure the distance between line ZZ and point 2 on the auxiliary view with your dividers.
Step 6: Transfer this measurement to line YY and line XX. In other words, draw construction lines parallel to XX and YY at the distance of the dividers.
Step 7: Repeat with points 4, 5 and 8 on the auxiliary view.
Step 8: The lines are then joined to obtain the full diagram.