



ZIMBABWE

MINISTRY OF PRIMARY AND SECONDARY EDUCATION

# TECHNICAL GRAPHICS AND DESIGN SYLLABUS

FORMS 1 - 4

2015 - 2022

Curriculum Development and Technical Services  
P.O. Box MP 133  
Mount Pleasant  
Harare

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## Contents

ACKNOWLEDGEMENTS.....	i
CONTENTS.....	ii
1.0 PREAMBLE.....	1
2.0 PRESENTATION OF THE SYLLABUS.....	2
3.0 AIMS.....	2
4.0 SYLLABUS OBJECTIVES.....	2
5.0 TOPICS.....	2
6.0 SCOPE AND SEQUENCE CHART.....	3
FORM 1.....	6
FORM 2.....	11
FORM 3.....	16
FORM 4.....	22
8.0 ASSESSMENT.....	27
ASSESSMENT MODEL.....	28

## 1.0 PREAMBLE

### 1.1 Introduction

The Technical Graphics and Design syllabus is designed for forms 1-4 learners. Design, drawing and problem solving will be used as learner centred approaches in implementing this syllabus. It promotes access to learning and teaching of Technical Graphics and Design regardless of gender and diverse needs.

The syllabus promotes learners' development of psychomotor skills and ensures that they develop socially, physically, emotionally and cognitively. It serves as a concrete foundation for entry into the construction, mining, industrial and manufacturing industries. In addition to developing intellectual and manual skills, the syllabus should stimulate innovation, creativity, enterprise skills, scientific and technological awareness and the ability to solve real life problems.

### 1.2 Rationale

This learning area is concerned with the development of design and drawing skills which will make learners useful members of their community/society. The learning area will encourage learners to adopt problem solving techniques which promote the application of scientific and technological skills. The learning area sets out to promote desirable enterprising and other life skills relevant to the 21st century.

The learning area will enable learners to appreciate the dignity of labour, integrity (unhu/ubuntu), patriotism, draughtsmanship, innovativeness, self-realization and aesthetic flair. This would allow greater flexibility in solving practical problems encountered in real life projects and design activities. An integral part of the learning area will be the appreciation of the raw materials used in the design and manufacturing of products. The learners will be equipped with the ability to shape and develop their communities.

### 1.3 Summary of Content (Knowledge, Skills and Attitudes)

This syllabus is intended to cover theory and practical activities in Technical Graphics and Design. It will focus on:

- Drawing room safety
- Drawing equipment and materials
- Design process
- Graphic communication
- Geometrical drawing
- Building drawing
- Mechanical drawing
- Enterprising skills
- Computer Aided Design (CAD)

### 1.4 Methodology and Time Allocation

#### Methodology

The syllabus is based on a learner-centred approach hinged on inclusivity in the learning of Technical Graphics and Design. Design and drawing will be an integral part of every practical exercise. The Design approach will be adopted to enhance problem-solving in learners. The learners are expected to take part in community projects. The use of Information Communication Technology (ICT) in drawing is strongly recommended.

#### Suggested Methods

- Discussions
- Project work
- Group work
- Discovery
- Problem – solving
- Demonstration
- Industrial and community attachments
- Educational Tours

#### Time Allocation

8x35/40 minutes periods per week .At least one educational tour per term is recommended.

### 1.5 Assumptions

The syllabus assumes that learners have:

- Drawing and measuring skills
- Knowledge of resource materials
- Elements of design and model making
- Numeracy and scientific skills
- Information and communication technology skills
- Ability to use of different media

## 1.6 Cross-cutting themes

In order to foster competency development in life and work, the following cross-cutting themes will be considered in the learning of Technical Graphics and Design:

- Gender
- Children's rights
- Financial Literacy
- Life Skills (HIV and AIDS)
- Child Protection
- Heritage Studies
- Collaboration
- Environmental Issues

## 2.0 PRESENTATION OF THE SYLLABUS

The Technical Graphics and Design Syllabus is a single document covering Forms 1-4. It contains the Preamble, Aims, Objectives, Syllabus Topics, Methodology, Scope and Sequence and Assessment.

## 3.0 AIMS

The syllabus aims to help learners to:

- 1.1 apply Technical Graphics and Design as a means of sustainable development for both the individual and society
- 1.2 appreciate the importance of health and safety in the working environments
- 1.3 develop a wide range of communication skills central to design and drawing
- 1.4 promote the development of curiosity, enquiry, initiative, ingenuity, resourcefulness and indiscrimination
- 1.5 encourage technological awareness, foster attitudes of co-operation and social responsibility, and develop abilities to improve the quality of the environment

## 4.0 SYLLABUS OBJECTIVES

By the end of the course, learners should be able to:

- 4.1. use a variety of graphical methods in designing and drawing
- 4.2. apply designing and drawing skill through problem solving methods

- 4.3. apply designing and drawing skills in community development
- 4.4. demonstrate safe use and storage of drawing equipment
- 4.5. use CAD in solving real life problems
- 4.6. communicate ideas by means of pictorial and orthographic sketches, drawings and models
- 4.7. use different media to communicate graphically
- 4.8. produce accurate geometrical, mechanical and building drawings
- 4.9. apply the design process in solving technical problems
- 4.10. use available resources sustainably while protecting the environment
- 4.11. apply creativity, inquiry and ingenuity in solving technical problems
- 4.12. apply internationally recognized standards in the production of mechanical and building drawings

## 5.0 TOPICS

- 5.1. Career Opportunities/Enterprises
- 5.2. Health and Safety
- 5.3. Drawing Equipment and Materials
- 5.4. Drawing Conventions
- 5.5. Illustrative Techniques
- 5.6. Design Process
- 5.7. Plane Geometry
- 5.8. Solid Geometry
- 5.9. Building Drawing
- 5.10. Mechanical Drawing
- 5.11. Computer Aided Design

## 6.0 SCOPE AND SEQUENCE

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
<b>6.1 Career opportunities</b>	<ul style="list-style-type: none"> <li>• Introduction to Technical Graphics and Design</li> <li>• Job opportunities related to Technical Graphics and Design</li> </ul>	<ul style="list-style-type: none"> <li>• Design of signs and symbols</li> </ul>	<ul style="list-style-type: none"> <li>• Graphic displays</li> <li>• Sign writing (school and community)</li> </ul>	<ul style="list-style-type: none"> <li>• Model making</li> <li>• Screen printing (school and community projects)</li> </ul>
<b>6.2 Health and safety</b>	<ul style="list-style-type: none"> <li>• Rules and regulations in the working environment</li> </ul>	<ul style="list-style-type: none"> <li>• Application of rules and regulations in the working environment</li> </ul>	<ul style="list-style-type: none"> <li>• Safety clothing</li> <li>• Safe use of tools</li> </ul>	<ul style="list-style-type: none"> <li>• Safety in the workshop</li> <li>• Hazardous substances</li> </ul>
<b>6.3 Drawing equipment and materials</b>	<ul style="list-style-type: none"> <li>• Introduction of drawing equipment and materials</li> <li>• Use of drawing equipment and materials</li> </ul>	<ul style="list-style-type: none"> <li>• Use of drawing equipment and materials</li> </ul>	<ul style="list-style-type: none"> <li>• Advanced drawing equipment and materials</li> </ul>	<ul style="list-style-type: none"> <li>• Use of drawing equipment-advanced</li> </ul>
<b>6.4 Drawing Conventions</b>	<ul style="list-style-type: none"> <li>• Types of lines, lettering</li> </ul>	<ul style="list-style-type: none"> <li>• Dimensioning</li> <li>• Symbols</li> </ul>	<ul style="list-style-type: none"> <li>• Drawing conventions</li> <li>• Drawing standards</li> </ul>	<ul style="list-style-type: none"> <li>• Application of drawing standards</li> </ul>
<b>6.5 Illustrative Techniques</b>	<ul style="list-style-type: none"> <li>• Freehand sketching on grid paper</li> <li>• Use of colour</li> </ul>	<ul style="list-style-type: none"> <li>• Rendering techniques</li> <li>• Pictorial drawing</li> </ul>	<ul style="list-style-type: none"> <li>• Graphic communication techniques                             <ul style="list-style-type: none"> <li>- Logo design</li> <li>- Flow charts</li> <li>- Directional maps</li> <li>- Statistical diagrams</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Design – illustrative techniques (Environmental issues in the school and community)</li> </ul>
<b>6.6 Design Process</b>	<ul style="list-style-type: none"> <li>• Design process                             <ul style="list-style-type: none"> <li>- design stages (school and home based projects e.g. pencil holders, candle stand, book shelf)</li> </ul> </li> <li>• Materials                             <ul style="list-style-type: none"> <li>- Types and properties</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Design process                             <ul style="list-style-type: none"> <li>- design stages (school and home based projects e.g. shoe rack, jewellery box)</li> </ul> </li> <li>• Tools                             <ul style="list-style-type: none"> <li>- Types and functions</li> </ul> </li> <li>• Materials                             <ul style="list-style-type: none"> <li>- Types and properties</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Design process                             <ul style="list-style-type: none"> <li>- design stages building structures, simple machines</li> </ul> </li> <li>• Model making                             <ul style="list-style-type: none"> <li>- Model making</li> </ul> </li> <li>• Tools                             <ul style="list-style-type: none"> <li>- Types and functions</li> </ul> </li> <li>• Materials                             <ul style="list-style-type: none"> <li>- Types and properties</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Design process                             <ul style="list-style-type: none"> <li>- design stages building structures, machines</li> </ul> </li> <li>• Model making                             <ul style="list-style-type: none"> <li>- Model making</li> </ul> </li> <li>• Tools                             <ul style="list-style-type: none"> <li>- Types and functions</li> </ul> </li> <li>• Materials                             <ul style="list-style-type: none"> <li>- Types and properties</li> </ul> </li> <li>• Solve community problems</li> </ul>

## 6.0 SCOPE AND SEQUENCE CONTD

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
<b>6.7 Plane Geometry</b>	<ul style="list-style-type: none"> <li>Line division</li> <li>Angles</li> <li>Plane shapes                             <ul style="list-style-type: none"> <li>Triangles</li> <li>Quadrilaterals</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Plane shapes                             <ul style="list-style-type: none"> <li>Polygons</li> <li>Circle geometry</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Blending of circles and curves</li> <li>Figures of equal area</li> <li>Linear and area reduction and enlargement of plane shapes</li> </ul>	<ul style="list-style-type: none"> <li>Scales (plain and diagonal)</li> <li>Loci</li> </ul>
<b>6.8 Solid Geometry</b>	<ul style="list-style-type: none"> <li>Isometric                             <ul style="list-style-type: none"> <li>use of instruments</li> </ul> </li> <li>Pictorial views to first and third angle orthographic projections (simple shaped blocks)</li> </ul>	<ul style="list-style-type: none"> <li>Orthographic views to isometric                             <ul style="list-style-type: none"> <li>freehand and use of instruments</li> <li>isometric circles</li> </ul> </li> <li>Orthographic views to oblique drawing (cabinet/cavalier)                             <ul style="list-style-type: none"> <li>freehand and use of instruments</li> </ul> </li> <li>One-point perspective                             <ul style="list-style-type: none"> <li>estimated</li> </ul> </li> <li>Pictorial views to first and third angle orthographic projection views (involving circles and curves)</li> <li>Sectional views</li> </ul>	<ul style="list-style-type: none"> <li>Lines in space</li> <li>First auxiliary views</li> </ul>	<ul style="list-style-type: none"> <li>Interpenetration of geometrical solids and surface development</li> <li>Sectional views of geometrical solids and true shapes of section</li> </ul>



TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
<b>6.9 Building drawing</b>	<ul style="list-style-type: none"> <li>Drawing both in orthographic and isometric projection of simple buildings and building details</li> </ul>	<ul style="list-style-type: none"> <li>Building materials                             <ul style="list-style-type: none"> <li>Types and properties</li> </ul> </li> <li>Building conventions</li> <li>Floor plans and elevations – simple structures</li> </ul>	<ul style="list-style-type: none"> <li>Sub structure                             <ul style="list-style-type: none"> <li>Suitability of materials</li> <li>Foundation</li> </ul> </li> <li>Super structure                             <ul style="list-style-type: none"> <li>walls</li> <li>wall openings</li> </ul> </li> <li>Types of roofs</li> <li>Building standards</li> <li>Building by-laws</li> </ul>	<ul style="list-style-type: none"> <li>Detailed working drawings                             <ul style="list-style-type: none"> <li>Floor plans and elevations</li> </ul> </li> <li>Community projects</li> </ul>
<b>6.10 Mechanical Drawing</b>	<ul style="list-style-type: none"> <li>Orthographic drawing</li> <li>Pictorial drawing                             <ul style="list-style-type: none"> <li>Crating</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Conversion and dimensioning                             <ul style="list-style-type: none"> <li>Engineering components</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Conventional representations and uses of fastening and locking devices</li> <li>Sectioning</li> </ul>	<ul style="list-style-type: none"> <li>Assembly drawing</li> </ul>
<b>6.11 Computer Aided Design</b>	<ul style="list-style-type: none"> <li>Introduction to CAD                             <ul style="list-style-type: none"> <li>Work space</li> <li>Paper setting</li> <li>Drawing commands</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Drawing tools</li> <li>Layers</li> </ul>	<ul style="list-style-type: none"> <li>Advanced drawing commands</li> <li>2D shapes</li> </ul>	<ul style="list-style-type: none"> <li>Three dimensional (3D forms) diagrams</li> <li>Other 3D softwares</li> </ul>

# FORM 1

## 7.0 COMPETENCY MATRIX

### 7.1 TOPIC 1: CAREER OPPORTUNITIES/ENTERPRISES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.1.1 Introduction to Technical Graphics	<ul style="list-style-type: none"> <li>recognize technical graphics as a means of communication</li> </ul>	<ul style="list-style-type: none"> <li>Application and uses of Technical Graphics in real life situations</li> </ul>	<ul style="list-style-type: none"> <li>Identifying application of Technical Graphics in everyday life situations</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>ICT tools</li> </ul>
7.1.2 Job Opportunities	<ul style="list-style-type: none"> <li>identify careers related to Technical Graphics</li> </ul>	<ul style="list-style-type: none"> <li>Identification of careers related to Technical Graphics</li> </ul>	<ul style="list-style-type: none"> <li>Identifying the possible careers</li> <li>Discussing related professions that use graphics</li> </ul>	<ul style="list-style-type: none"> <li>Resource person</li> <li>ICT tools</li> <li>Recommended textbooks</li> </ul>

### 7.2 TOPIC 2: HEALTH AND SAFETY

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.2.1 Rules and Regulations	<ul style="list-style-type: none"> <li>demonstrate an understanding of safety rules in the working area</li> <li>apply First Aid skills</li> </ul>	<ul style="list-style-type: none"> <li>Working area rules</li> <li>Accident prevention</li> </ul>	<ul style="list-style-type: none"> <li>Identifying possible dangerous working conditions</li> <li>Explaining methods of preventing accidents in the working area</li> <li>Demonstrating first aid skills</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>First Aid Kit</li> <li>Recommended textbooks</li> <li>Resource person</li> </ul>

**7.3 TOPIC 3: DRAWING EQUIPMENT AND MATERIALS**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.3.1 Introduction of Drawing Equipment and Materials	<ul style="list-style-type: none"> <li>identify the various equipment used in drawing</li> <li>name the different materials used in drawings</li> <li>maintain equipment in good working condition</li> <li>prevent damage of equipment</li> <li>identify different types of graphic communication media</li> </ul>	<ul style="list-style-type: none"> <li>Equipment and materials</li> </ul>	<ul style="list-style-type: none"> <li>Identifying drawing equipment and material</li> <li>Naming different types and sizes of paper</li> <li>Maintaining the drawing equipment</li> <li>Analyzing conditions resulting in damaged equipment</li> <li>Identifying different types of media</li> </ul>	<ul style="list-style-type: none"> <li>Realia such as types of drawing paper, drawing equipment</li> <li>Recommended textbooks</li> <li>ICT tools</li> </ul>
7.3.2 Use of Drawing Equipment and Material	<ul style="list-style-type: none"> <li>use drawing equipment and materials correctly</li> </ul>	<ul style="list-style-type: none"> <li>Use of equipment and materials</li> </ul>	<ul style="list-style-type: none"> <li>Setting paper on the drawing board and practising drawing lines</li> </ul>	<ul style="list-style-type: none"> <li>Drawing paper</li> <li>Drawing equipment</li> <li>Recommended textbooks</li> </ul>

**7.4 TOPIC 4: DRAWING CONVENTIONS**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.4.1 Types of lines and lettering	<ul style="list-style-type: none"> <li>identify different types of lines</li> <li>draw different types of lines</li> <li>use of lower and upper case of printing</li> </ul>	<ul style="list-style-type: none"> <li>Linework</li> <li>Lettering</li> </ul>	<ul style="list-style-type: none"> <li>Identifying the lines</li> <li>Drawing the lines</li> <li>Printing and labelling on drawings</li> </ul>	<ul style="list-style-type: none"> <li>Recommended textbooks</li> <li>Print media</li> <li>ICT tools</li> </ul>

**7.5 TOPIC 5: ILLUSTRATIVE TECHNIQUES**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.5.1 Freehand Sketching on Grid Paper	<ul style="list-style-type: none"> <li>sketch objects freehand on grid paper</li> </ul>	<ul style="list-style-type: none"> <li>Sketching</li> </ul>	<ul style="list-style-type: none"> <li>Sketching 2D shapes on orthographic grid paper</li> </ul>	<ul style="list-style-type: none"> <li>Orthographic grid paper</li> <li>Recommended textbooks</li> <li>ICT tools</li> </ul>

**7.5 TOPIC 5: ILLUSTRATIVE TECHNIQUES CONTD..**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.5.2 Use of Colour	<ul style="list-style-type: none"> <li>select appropriate colours</li> <li>use appropriate colours effectively</li> </ul>	<ul style="list-style-type: none"> <li>Media</li> </ul>	<ul style="list-style-type: none"> <li>Identifying and using appropriate colours to render logos and diagrams</li> </ul>	<ul style="list-style-type: none"> <li>Recommended textbooks</li> <li>ICT books</li> <li>Colouring media</li> </ul>

**7.6 TOPIC 6: DESIGN PROCESS**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.6.1 Design Process	<ul style="list-style-type: none"> <li>outline the design process stages</li> <li>design and draw solutions to graphic communication problems</li> </ul>	<ul style="list-style-type: none"> <li>Design process                             <ul style="list-style-type: none"> <li>- problem identification</li> <li>- design brief</li> <li>- Research</li> <li>- Possible solutions</li> <li>- chosen solution</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Outlining the design process stages up to the chosen solution</li> <li>Investigating existing ideas</li> <li>Sketching of possible solutions</li> <li>Drawing of the final chosen solution</li> </ul>	<ul style="list-style-type: none"> <li>Recommended text-books</li> <li>Print media</li> <li>ICT</li> </ul>

**7.7 TOPIC 7: PLANE GEOMETRY**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.7.1 Plane Geometry	<ul style="list-style-type: none"> <li>divide a straight line into a number of equal parts</li> <li>construct special angles</li> <li>determine sizes of angles</li> <li>construct plane shapes to satisfy</li> </ul>	<ul style="list-style-type: none"> <li>Lines</li> <li>Angles                             <ul style="list-style-type: none"> <li>- Drawing, construction and measuring</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Drawing and dividing lines into equal parts using drawing instruments</li> <li>Constructing, drawing</li> </ul>	<ul style="list-style-type: none"> <li>ICT</li> <li>Print media</li> <li>Drawing equipment and instruments</li> </ul>

**7.7 TOPIC 7: PLANE GEOMETRY CONTD..**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.7.1 Plane Geometry	given conditions	<ul style="list-style-type: none"> <li>• Application of angles</li> <li>• Plane shapes                             <ul style="list-style-type: none"> <li>- Construction and application</li> </ul> </li> </ul>	and measuring special angles <ul style="list-style-type: none"> <li>• Constructing plane shapes to satisfy given specifications</li> <li>• Applying lines, angles and plane shapes to real life problems</li> </ul>	

**7.8 TOPIC 8: SOLID GEOMETRY**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.8.1 Solid Geometry	<ul style="list-style-type: none"> <li>• use instruments to draw isometric views on plain paper</li> <li>• convert isometric to 1st angle orthographic views</li> </ul>	<ul style="list-style-type: none"> <li>• Isometric drawing                             <ul style="list-style-type: none"> <li>- Use of instruments</li> </ul> </li> <li>• Pictorial views to 1st angle projection (shaped blocks)</li> </ul>	<ul style="list-style-type: none"> <li>• Drawing isometric views using instruments</li> <li>• Converting isometric to 1st angle orthographic views</li> </ul>	<ul style="list-style-type: none"> <li>• Recommended text-books</li> <li>• Shaped blocks</li> <li>• ICT tools</li> <li>• Print media</li> </ul>

**7.9 TOPIC 9: BUILDING DRAWING**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.9.1 Isometric Projections	<ul style="list-style-type: none"> <li>• draw isometric views of one to two roomed buildings</li> <li>• illustrate building details in isometric views</li> </ul>	<ul style="list-style-type: none"> <li>• Buildings</li> <li>• Building details</li> </ul>	<ul style="list-style-type: none"> <li>• Drawing the isometric views</li> <li>• Illustrating the building details</li> </ul>	<ul style="list-style-type: none"> <li>• Realia such as the actual buildings</li> <li>• Print media</li> </ul>
7.9.2 Orthographic Projections	<ul style="list-style-type: none"> <li>• draw orthographic views of one to two roomed buildings</li> <li>• illustrate building details in orthographic views</li> </ul>	<ul style="list-style-type: none"> <li>• Buildings</li> <li>• Building details</li> </ul>	<ul style="list-style-type: none"> <li>• Drawing the orthographic views</li> <li>• Illustrating the building details</li> </ul>	<ul style="list-style-type: none"> <li>• Realia such as the actual buildings</li> <li>• Print media</li> <li>• ICT tools</li> </ul>

**7.10 TOPIC 10: MECHANICAL DRAWING**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
<b>7.10.1 Orthographic Drawing</b>	<ul style="list-style-type: none"> <li>convert pictorial views to 1<sup>st</sup> angle orthographic views</li> </ul>	<ul style="list-style-type: none"> <li>Pictorial to orthographic (shaped blocks)                             <ul style="list-style-type: none"> <li>1<sup>st</sup> angle projection</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Converting pictorial to the orthographic views</li> </ul>	<ul style="list-style-type: none"> <li>Print Media</li> <li>Realia such as shaped blocks</li> <li>ICT tools</li> </ul>
<b>7.10.2 Pictorial Drawing</b>	<ul style="list-style-type: none"> <li>convert orthographic to pictorial views (isometric; oblique)</li> <li>calculate overall dimensions of orthographic views</li> </ul>	<ul style="list-style-type: none"> <li>Orthographic to pictorial (shaped blocks)                             <ul style="list-style-type: none"> <li>Isometric drawing</li> <li>Oblique drawing</li> <li>Crating</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Converting orthographic views to the pictorial views</li> <li>Calculating overall dimensions</li> <li>Crating</li> </ul>	<ul style="list-style-type: none"> <li>Realia such as shaped blocks</li> <li>ICT tools</li> <li>Print Media</li> </ul>

**7.11 TOPIC 11: COMPUTER AIDED DESIGN**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
<b>7.11.1 Introduction to CAD</b>	<ul style="list-style-type: none"> <li>set out work space on a computer</li> <li>set paper size</li> <li>identify the drawing commands</li> <li>use drawing commands to draw plane shapes</li> </ul>	<ul style="list-style-type: none"> <li>Work space</li> <li>Paper setting</li> <li>Drawing commands</li> </ul>	<ul style="list-style-type: none"> <li>Setting out work space on a computer</li> <li>Setting paper size</li> <li>Identifying the drawing commands</li> <li>Using drawing commands to draw plane shapes</li> </ul>	<ul style="list-style-type: none"> <li>CAD software</li> <li>Resource person</li> <li>ICT tools</li> <li>Print Media</li> </ul>

## FORM 2

### 7.0 COMPETENCY MATRIX

#### 7.1 TOPIC 1: CAREER OPPORTUNITIES/ENTERPRISES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.1.1 Design of Signs and Symbols	<ul style="list-style-type: none"> <li>identify the community problems related to signs and symbols</li> <li>apply various media to produce signs and symbols for the community</li> </ul>	<ul style="list-style-type: none"> <li>Designing to solve community problems</li> </ul>	<ul style="list-style-type: none"> <li>Identifying community problems</li> <li>Drawing the signs and symbols</li> <li>Applying media on drawn signs and symbols</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>ICT tools</li> <li>Realia such as road signs and directional signs</li> </ul>

#### 7.2 TOPIC 2: HEALTH AND SAFETY

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.2.1 Application of Rules and Regulations in the Working Environment	<ul style="list-style-type: none"> <li>outline safety regulations at workplaces</li> <li>demonstrate safe working habits</li> </ul>	<ul style="list-style-type: none"> <li>Safety rules and regulations</li> </ul>	<ul style="list-style-type: none"> <li>Outlining the safety regulations</li> <li>Practicing safe use and storage of drawing equipment</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>Resource persons</li> </ul>

#### 7.3 TOPIC 3: DRAWING EQUIPMENT AND MATERIALS

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.3.1 Use of Drawing Equipment and Materials	<ul style="list-style-type: none"> <li>identify drawing equipment and materials</li> <li>use drawing equipment and materials</li> </ul>	<ul style="list-style-type: none"> <li>Drawing equipment and materials</li> </ul>	<ul style="list-style-type: none"> <li>Identifying the drawing equipment and materials</li> <li>Drawing shapes involving vertical and horizontal lines and patterns</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> </ul>

**7.4 TOPIC 4: DRAWING CONVENTIONS**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.4.1 Dimensioning	<ul style="list-style-type: none"> <li>Identify types of dimensions on a drawing</li> <li>illustrate methods of dimensioning</li> <li>use scales 1:1, 1:2, 2:1</li> </ul>	<ul style="list-style-type: none"> <li>Dimensioning drawings</li> <li>Types of dimensions</li> </ul>	<ul style="list-style-type: none"> <li>Identifying the types of dimensions</li> <li>Illustrating the dimensioning methods</li> <li>using scale when dimensioning drawings</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> </ul>
7.4.2 Symbols	<ul style="list-style-type: none"> <li>differentiate between image and idea related</li> </ul>	<ul style="list-style-type: none"> <li>Types of symbols</li> </ul>	<ul style="list-style-type: none"> <li>Drawing ideograms</li> <li>pictograms and arbitrary symbols</li> </ul>	<ul style="list-style-type: none"> <li>ICT tools</li> <li>Print Media</li> </ul>

**7.5 TOPIC 5: ILLUSTRATIVE TECHNIQUES**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.5.1 Rendering Techniques	<ul style="list-style-type: none"> <li>demonstrate a way of showing different textures of surfaces</li> </ul>	<ul style="list-style-type: none"> <li>Types of rendering techniques</li> </ul>	<ul style="list-style-type: none"> <li>Applying appropriate media to produce different types of rendering techniques</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>Realia such as different kinds of surfaces</li> </ul>
7.5.2 Pictorial Drawing	<ul style="list-style-type: none"> <li>construct diagrams in isometric</li> <li>construct diagrams in oblique</li> </ul>	<ul style="list-style-type: none"> <li>Isometric drawing</li> <li>Oblique drawing</li> </ul>	<ul style="list-style-type: none"> <li>Constructing diagrams in isometric and oblique</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>ICT tools</li> </ul>

**7.6 TOPIC 6: DESIGN PROCESS**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.6. Design Process	<ul style="list-style-type: none"> <li>outline the design process</li> <li>identify the materials and tools used to produce mock-ups</li> <li>produce a mock-up of the chosen solution</li> </ul>	<ul style="list-style-type: none"> <li>Design process</li> <li>Mock-up</li> <li>Materials and tools</li> </ul>	<ul style="list-style-type: none"> <li>Outlining the design process</li> <li>Identifying materials and tools</li> <li>Producing mock-ups</li> </ul>	<ul style="list-style-type: none"> <li>Recommended textbooks</li> <li>Print media</li> <li>ICT tools</li> <li>Cutting tools</li> </ul>



**7.7 TOPIC 7: PLANE GEOMETRY**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.7.1 Plane Geometry	<ul style="list-style-type: none"> <li>construct regular polygons to satisfy given conditions</li> <li>identify different parts of a circle</li> <li>construct circles to satisfy given conditions</li> <li>apply the construction of plane shapes in design</li> </ul>	<ul style="list-style-type: none"> <li>Plane shapes                             <ul style="list-style-type: none"> <li>- Polygons</li> <li>- Circles (inscribed, circumscribed, e-inscribed)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Constructing regular polygons according to stated conditions</li> <li>Identifying different parts of a circle</li> <li>Constructing circles according to stated conditions</li> <li>Applying the construction of plane shape in design</li> </ul>	<ul style="list-style-type: none"> <li>Recommended textbooks</li> <li>ICT tools</li> <li>Print media</li> </ul>

**7.8 TOPIC 8: SOLID GEOMETRY**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.8.1 Solid Geometry	<ul style="list-style-type: none"> <li>convert orthographic to the pictorial views</li> <li>use instruments to draw the pictorial views</li> <li>sketch the freehand pictorial views</li> <li>construct circles and curves in pictorial views</li> <li>draw sectional views of shaped blocks</li> </ul>	<ul style="list-style-type: none"> <li>Orthographic to pictorial views in:                             <ul style="list-style-type: none"> <li>- Isometric</li> <li>- Oblique</li> <li>- Perspective (Freehand, use of instruments)</li> </ul> </li> <li>Pictorial views to 1<sup>st</sup> angle orthographic projection (circles and curves)</li> <li>Sectional views</li> </ul>	<ul style="list-style-type: none"> <li>Converting orthographic to pictorial views by use of freehand and instruments</li> <li>Constructing curves and circles in pictorial views</li> <li>Drawing of sectional views of shaped blocks</li> </ul>	<ul style="list-style-type: none"> <li>ICT tools</li> <li>Print media</li> <li>Engineering components</li> <li>Buildings</li> </ul>

**7.9 TOPIC 9: BUILDING DRAWING**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
<b>7.9.1 Building Materials</b>	<ul style="list-style-type: none"> <li>identify building materials</li> <li>describe the properties of building materials</li> </ul>	<ul style="list-style-type: none"> <li>Types of building materials</li> <li>Properties of building materials</li> </ul>	<ul style="list-style-type: none"> <li>Identifying building materials</li> <li>Describing properties of building materials</li> </ul>	<ul style="list-style-type: none"> <li>Realia such as building materials</li> <li>Recommended textbooks</li> <li>ICT tools</li> </ul>
<b>7.9.2 Building Conventions</b>	<ul style="list-style-type: none"> <li>identify the conventions used in building drawing</li> <li>apply building conventions on drawings</li> </ul>	<ul style="list-style-type: none"> <li>Types of building conventions</li> <li>Use of building conventions</li> </ul>	<ul style="list-style-type: none"> <li>Identifying conventions used in building drawing</li> <li>Applying building drawing conventions on drawings</li> </ul>	<ul style="list-style-type: none"> <li>Recommended textbooks</li> <li>ICT tools</li> <li>Printed media</li> </ul>
<b>7.9.3 Floor Plans and Elevations</b>	<ul style="list-style-type: none"> <li>draw floor plans of buildings</li> <li>draw elevations of buildings</li> </ul>	<ul style="list-style-type: none"> <li>Buildings (up to four rooms)                             <ul style="list-style-type: none"> <li>- Floor plans</li> <li>- elevations</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Drawing the floor plans</li> <li>Drawing the elevations</li> </ul>	<ul style="list-style-type: none"> <li>Recommended textbooks</li> <li>Printed media</li> <li>ICT tools</li> </ul>

**7.10 TOPIC 10: MECHANICAL DRAWING**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
<b>7.10.1 Conversion and Dimensioning</b>	<ul style="list-style-type: none"> <li>convert pictorial views of engineering components to orthographic dimension engineering components</li> </ul>	<ul style="list-style-type: none"> <li>Engineering components</li> <li>Dimensioning</li> </ul>	<ul style="list-style-type: none"> <li>Converting pictorial views of engineering components to orthographic dimensioning the engineering drawings</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>Realia such as engineering components</li> </ul>

**7.11 TOPIC 11: COMPUTER AIDED DESIGN**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.11.1 Drawing Tools	<ul style="list-style-type: none"> <li>• identify CAD drawing tools</li> <li>• use CAD drawing tools to draw plane shapes</li> </ul>	<ul style="list-style-type: none"> <li>• Drawing tools</li> </ul>	<ul style="list-style-type: none"> <li>• Identifying the CAD drawing tools</li> <li>• Using CAD drawing tools to draw the shapes</li> </ul>	<ul style="list-style-type: none"> <li>• ICT tools</li> <li>• CAD software</li> <li>• Recommended textbooks</li> <li>• Resource person</li> </ul>
7.11.2 Layers	<ul style="list-style-type: none"> <li>• use different line weights in CAD</li> <li>• use different line colours in CAD</li> </ul>	<ul style="list-style-type: none"> <li>• Layers</li> <li>• Line weight</li> <li>• Line colour</li> </ul>	<ul style="list-style-type: none"> <li>• Using different line weights in CAD</li> <li>• Using different line colours in CAD</li> </ul>	<ul style="list-style-type: none"> <li>• ICT tools</li> <li>• CAD software</li> <li>• Recommended textbooks</li> <li>• Resource person</li> </ul>

### FORM 3

#### 7.0 COMPETENCY MATRIX

##### 7.1 TOPIC 1: CAREER OPPORTUNITIES/ENTERPRISES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.1.1 Graphic Displays	<ul style="list-style-type: none"> <li>demonstrate the ability to use graphics to produce signs</li> </ul>	<ul style="list-style-type: none"> <li>Graphic Design</li> </ul>	<ul style="list-style-type: none"> <li>Using one or more symbols to create a meaningful display or poster</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>ICT tools</li> </ul>
7.1.2 Sign Writing (School and Community)	<ul style="list-style-type: none"> <li>identify the need for posters or displays in the school and community</li> <li>produce posters or displays for the school and community</li> </ul>	<ul style="list-style-type: none"> <li>Sign writing related to the school and community</li> </ul>	<ul style="list-style-type: none"> <li>Identifying places that need signs for relaying information</li> <li>Producing signs or posters for school and community</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>ICT tools</li> <li>Schools and communities</li> </ul>

##### 7.2 TOPIC 2: SAFETY AND HEALTH

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.2.1 Safety Clothing	<ul style="list-style-type: none"> <li>identify types of safety clothing</li> <li>match the type of clothing to particular jobs</li> </ul>	<ul style="list-style-type: none"> <li>Safety in the working environment</li> <li>Safety clothing</li> </ul>	<ul style="list-style-type: none"> <li>Identifying types of safety clothing suitable for specific jobs</li> </ul>	<ul style="list-style-type: none"> <li>Realia such as safety clothing</li> <li>Printed media</li> </ul>
7.2.2 Safe Use of Tools	<ul style="list-style-type: none"> <li>demonstrate correct handling of tools</li> <li>select appropriate tools for a job</li> </ul>	<ul style="list-style-type: none"> <li>Usage of tools</li> </ul>	<ul style="list-style-type: none"> <li>Cutting, drilling and shaping materials using different tools</li> <li>Selecting appropriate tools for a job</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>Realia such as cutting, shaping and drilling tools</li> </ul>

**7.3 TOPIC 3: DRAWING EQUIPMENT AND MATERIALS**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.3.1 Advanced Drawing Equipment	<ul style="list-style-type: none"> <li>select appropriate equipment for drawing</li> <li>use advanced drawing equipment for improved drawing standards</li> </ul>	<ul style="list-style-type: none"> <li>Advanced drawing equipment e.g.                             <ul style="list-style-type: none"> <li>Templates and flexible curves</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Choosing and using appropriate equipment for the production of improved drawing standards</li> </ul>	<ul style="list-style-type: none"> <li>Realia such as drawing templates and flexible curves</li> <li>Print Media</li> </ul>

**7.4 TOPIC 4: DRAWING CONVENTIONS**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.4.1 Drawing Conventions	<ul style="list-style-type: none"> <li>identify the drawing conventions</li> <li>apply appropriate use of the drawing conventions in building and mechanical drawings</li> </ul>	<ul style="list-style-type: none"> <li>Standard drawing conventions</li> </ul>	<ul style="list-style-type: none"> <li>Identifying different types of drawing conventions</li> <li>Applying appropriate conventions in building and mechanical drawings</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> </ul>

**7.5 TOPIC 5: ILLUSTRATIVE TECHNIQUES**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.5.1 Graphic Communication Techniques	<ul style="list-style-type: none"> <li>present numerical information graphically</li> <li>correctly sequence symbols in flow charts</li> <li>produce directional maps using linear scale</li> <li>use a combination of symbols and relevant data to produce a logo</li> </ul>	<ul style="list-style-type: none"> <li>Logo designs</li> <li>Flow charts</li> <li>Directional maps</li> <li>Statistical diagrams</li> </ul>	<ul style="list-style-type: none"> <li>Producing and interpreting graphical data from bar graphs, linear and pie charts</li> <li>Producing logos, flow charts and directional maps to solve school and community based problems</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>ICT tools</li> </ul>

**7.6 TOPIC 6: DESIGN PROCESS**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.6.1 Design Process	<ul style="list-style-type: none"> <li>apply the design process to solve identified problems</li> <li>identify suitable materials and tools for the production of the mock-up</li> </ul>	<ul style="list-style-type: none"> <li>design process stages</li> <li>Identification of suitable material, and tools for the production of mock-ups</li> </ul>	<ul style="list-style-type: none"> <li>Applying the design process to solve identified problems</li> <li>Identifying suitable materials and tools for production of mock up solution</li> <li>Producing of mock-up from the best chosen solution</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>ICT tools</li> <li>Modelling tools and materials</li> </ul>

**7.7 TOPIC 7: PLANE GEOMETRY**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.7.1 Plane Geometry	<ul style="list-style-type: none"> <li>construct tangents to circles to satisfy given conditions</li> <li>blend arcs and circles to satisfy given conditions</li> </ul>	<ul style="list-style-type: none"> <li>Blending of circles and curves                             <ul style="list-style-type: none"> <li>Tangents</li> <li>Arcs to circles</li> <li>Circle to circles</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Constructing tangents to satisfy stated conditions</li> <li>Blending arcs and circles to satisfy given conditions</li> </ul>	<ul style="list-style-type: none"> <li>ICT tools</li> <li>Print media</li> </ul>

**7.8 TOPIC 8: SOLID GEOMETRY**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.8.1 Solid Geometry	<ul style="list-style-type: none"> <li>determine the true lengths and angles of inclination to horizontal (HP) and vertical (VP) planes</li> <li>solve real life problems using lines in space</li> </ul>	<ul style="list-style-type: none"> <li>Lines in space                             <ul style="list-style-type: none"> <li>True lengths</li> <li>True angles of inclination</li> <li>Application of lines in space</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Determining the true lengths and angles of inclination to horizontal (HP) and vertical (VP) planes of lines by use of construction</li> </ul>	<ul style="list-style-type: none"> <li>ICT tools</li> <li>Print media</li> <li>Field tours</li> <li>Modelling tools and materials</li> </ul>

**7.8 TOPIC 8: SOLID GEOMETRY CONTD....**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	<ul style="list-style-type: none"> <li>• draw two point perspective drawings of shaped blocks and buildings</li> <li>• construct surface developments of prisms, cylinders, cones and pyramids</li> <li>• determine the line of intersection between geometrical solids</li> <li>• establish sectional views and true shapes of truncated geometrical solids</li> <li>• draw first auxiliary views as viewed at different angles</li> </ul>	<ul style="list-style-type: none"> <li>• Two – point perspective (calculated)</li> <li>• Surface developments geometrical solids</li> <li>• Interpenetration of geometrical solids</li> <li>• Sectional views of geometrical solids</li> <li>• First auxiliary views</li> </ul>	<ul style="list-style-type: none"> <li>• Applying lines in space to given real life problems</li> <li>• Drawing two point perspective views of shaped blocks and buildings</li> <li>• Cutting out patterns of surface developments</li> <li>• Constructing surface development of the solids</li> <li>• Determining lines of intersection between geometrical solids</li> <li>• Establishing sectional views and true shapes of truncated geometrical solids</li> <li>• Drawing first auxiliary views as viewed at different angles</li> </ul>	

**7.9 TOPIC 9: BUILDING DRAWING**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
<b>7.9.1 Substructure</b>	<ul style="list-style-type: none"> <li>• identify types of foundations</li> <li>• describe properties of materials for foundations</li> <li>• choose the correct foundation for a particular structure</li> <li>• select the suitable foundation for different types of soils</li> <li>• draw different types of foundations</li> </ul>	<ul style="list-style-type: none"> <li>• Types of foundations</li> <li>• Materials for foundations</li> <li>• Suitability of foundations</li> </ul>	<ul style="list-style-type: none"> <li>• Identifying types of foundations</li> <li>• Describing properties of materials for foundations</li> <li>• Choosing the correct foundation for a particular structure</li> <li>• Selecting the suitable foundation for different types of soils</li> <li>• Drawing different types of foundations</li> </ul>	<ul style="list-style-type: none"> <li>• ICT tools</li> <li>• Printed media</li> <li>• Resource person</li> </ul>
<b>7.9.2 Super Structure</b>	<ul style="list-style-type: none"> <li>• identify different types of walls</li> <li>• identify materials used for walling</li> <li>• draw details of wall and wall openings</li> <li>• indicate a suitable wall finish</li> </ul>	<ul style="list-style-type: none"> <li>• Types of walls</li> <li>• Walling materials</li> <li>• Wall openings</li> <li>• Wall finishes</li> </ul>	<ul style="list-style-type: none"> <li>• Identifying different types of walls</li> <li>• Identifying materials used for walling</li> <li>• Drawing details of wall and wall openings</li> </ul>	<ul style="list-style-type: none"> <li>• ICT tools</li> <li>• Realia such as the walls</li> <li>• Print Media</li> </ul>
<b>7.9.3 Roof Types</b>	<ul style="list-style-type: none"> <li>• identify types of roofs</li> <li>• draw different types of roofs</li> </ul>	<ul style="list-style-type: none"> <li>• Types of roofs</li> </ul>	<ul style="list-style-type: none"> <li>• Identifying types of roofs</li> <li>• Drawing different types of roofs</li> </ul>	<ul style="list-style-type: none"> <li>• Recommended textbooks</li> <li>• Realia such as the different types of roofs</li> <li>• ICT tools</li> </ul>
<b>7.9.4 Building Standards</b>	<ul style="list-style-type: none"> <li>• draw buildings conforming to model building by-laws</li> </ul>	<ul style="list-style-type: none"> <li>• Building by-laws</li> </ul>	<ul style="list-style-type: none"> <li>• Drawing buildings conforming to model building by-laws</li> </ul>	<ul style="list-style-type: none"> <li>• Model building by-laws manual</li> </ul>



**7.10 TOPIC 10: MECHANICAL DRAWING**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
<b>7.10.1 Fastening and Locking Devices</b>	<ul style="list-style-type: none"> <li>identify fastening and locking devices</li> <li>conventionally draw fastening and locking devices</li> </ul>	<ul style="list-style-type: none"> <li>Fastening and locking devices</li> </ul>	<ul style="list-style-type: none"> <li>Identifying fastening and locking devices</li> <li>Conventionally drawing fastening and locking devices</li> </ul>	<ul style="list-style-type: none"> <li>Realia such as fastening and locking devices</li> <li>Print media</li> <li>ICT tools</li> </ul>
<b>7.10.2 Sections</b>	<ul style="list-style-type: none"> <li>identify different types of sections</li> <li>illustrate the different sections</li> </ul>	<ul style="list-style-type: none"> <li>Sections                             <ul style="list-style-type: none"> <li>Removed</li> <li>Revolved</li> <li>Half</li> <li>Staggered</li> <li>Local/part</li> <li>Full</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Identifying the different types of sections</li> <li>Illustrating the different sections</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>ICT tools</li> <li>Realia such as sectioned blocks</li> </ul>

**7.11 TOPIC 11: COMPUTER AIDED DESIGN**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
<b>7.11.1 Advanced Drawing Commands</b>	<ul style="list-style-type: none"> <li>draw 2D diagrams using advanced drawing commands</li> </ul>	<ul style="list-style-type: none"> <li>Advanced drawing commands</li> </ul>	<ul style="list-style-type: none"> <li>Drawing 2D diagrams using advanced drawing commands</li> </ul>	<ul style="list-style-type: none"> <li>ICT tools</li> <li>CAD software</li> <li>Recommended textbooks</li> <li>Resource person</li> </ul>

## FORM 4

### 7.0 COM PETENCY MATRIX

#### 7.1 TOPIC 1: CAREER OPPORTUNITIES/ENTERPRISES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.1.1 Model Making	<ul style="list-style-type: none"> <li>produce 3D models from working drawings for clients in the community</li> <li>Use appropriate materials in model construction</li> </ul>	<ul style="list-style-type: none"> <li>Production of 3D models for clients in the community projects</li> </ul>	<ul style="list-style-type: none"> <li>Producing 3D models from working drawings</li> <li>Costing (labour and materials)</li> <li>Using appropriate tools and materials to produce the models</li> </ul>	<ul style="list-style-type: none"> <li>Realia such as working drawings</li> <li>Recommended textbooks</li> <li>Print media</li> <li>Modelling tools and materials</li> <li>ICT tools</li> </ul>
7.1.2 Screen Printing	<ul style="list-style-type: none"> <li>identify different printing styles</li> <li>apply suitable printing styles</li> </ul>	<ul style="list-style-type: none"> <li>Printing school and community projects</li> </ul>	<ul style="list-style-type: none"> <li>Identifying the different printing styles</li> <li>Applying suitable printing styles on community projects</li> </ul>	<ul style="list-style-type: none"> <li>Realia such as printing equipment and materials</li> <li>Recommended textbooks</li> <li>Print media</li> </ul>

#### 7.2 TOPIC 2: SAFETY AND HEALTH

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.2.1 Safety in the Workshop	<ul style="list-style-type: none"> <li>identify safe working conditions in a working environment</li> </ul>	<ul style="list-style-type: none"> <li>Workshop safety</li> </ul>	<ul style="list-style-type: none"> <li>Identifying safe working conditions in a working environment</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>Resource person</li> </ul>
7.2.2 Hazardous Substances	<ul style="list-style-type: none"> <li>identify the symbols of hazardous substances used in the workshop</li> <li>justify safe storage of hazardous substances</li> <li>use hazardous substances safely</li> </ul>	<ul style="list-style-type: none"> <li>Hazardous substances - Storage and use</li> </ul>	<ul style="list-style-type: none"> <li>Identifying symbols depicting hazardous substances on containers</li> <li>Justifying safe storage of hazardous substances</li> <li>Using hazardous substances</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>School Science Laboratories</li> </ul>

### 7.3 TOPIC 3: DRAWING EQUIPMENT AND MATERIALS

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.3.1 Use of Advanced Drawing Equipment	<ul style="list-style-type: none"> <li>use advanced drawing equipment for standard conventional drawings</li> </ul>	<ul style="list-style-type: none"> <li>Drawing equipment</li> </ul>	<ul style="list-style-type: none"> <li>Drawing using advanced drawing equipment</li> </ul>	<ul style="list-style-type: none"> <li>Realia such as draughting equipment</li> <li>Print Media</li> </ul>

### 7.4 TOPIC 4: DRAWING CONVENTIONS

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.4.1 Application of Drawing Standards	<ul style="list-style-type: none"> <li>demonstrate correct use of drawing standards and conventions</li> </ul>	<ul style="list-style-type: none"> <li>Drawing standards</li> </ul>	<ul style="list-style-type: none"> <li>Drawing house plans applying local authority standards</li> <li>Drawing machine components applying PD 7308 standards</li> </ul>	<ul style="list-style-type: none"> <li>Local authority model by-laws</li> <li>Print media</li> </ul>

### 7.5 TOPIC 5: ILLUSTRATIVE TECHNIQUES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.5.1 Illustrative Techniques	<ul style="list-style-type: none"> <li>solve practical problems requiring the use of logos and posters in the school and community</li> </ul>	<ul style="list-style-type: none"> <li>Logo and poster designs</li> </ul>	<ul style="list-style-type: none"> <li>Identifying areas that need posters and logos in the school and community</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>ICT tools</li> </ul>

### 7.6 TOPIC 6: DESIGN PROCESS

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.6.1 Design Process	<ul style="list-style-type: none"> <li>formulate the design brief</li> <li>produce a mock-up and model of the final design</li> <li>Identify suitable materials for mock-up and model</li> </ul>	<ul style="list-style-type: none"> <li>Stages of the design process</li> </ul>	<ul style="list-style-type: none"> <li>Outlining the design process</li> <li>Sketching of ideas</li> <li>Producing working drawings</li> <li>Constructing mock-up and model</li> <li>Evaluating the design process</li> <li>Producing the design folio</li> </ul>	<ul style="list-style-type: none"> <li>Print media</li> <li>ICT tools</li> <li>Resource person</li> <li>Field trips</li> </ul>

### 7.7 TOPIC 7: PLANE GEOMETRY

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.7.1 Plane Geometry	<ul style="list-style-type: none"> <li>construct plane and diagonal scales using stated ratios</li> <li>trace loci of mechanisms</li> <li>construct special curves to satisfy stated conditions</li> </ul>	<ul style="list-style-type: none"> <li>Plane scales</li> <li>Diagonal scales</li> <li>Loci                             <ul style="list-style-type: none"> <li>- Mechanisms</li> <li>- Ellipse</li> <li>- Parabola</li> <li>- Hyperbola</li> <li>- Spirals</li> <li>- Cycloidal curves</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Constructing and using plane and diagonal scales to satisfy given ratios</li> <li>Tracing loci of mechanisms</li> <li>Constructing special curves to satisfy stated conditions</li> </ul>	<ul style="list-style-type: none"> <li>ICT tools</li> <li>Print media</li> </ul>

**7.8 TOPIC 8: SOLID GEOMETRY**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.8.1 Solid Geometry	<ul style="list-style-type: none"> <li>construct surface developments of parts of intersecting solids (co-axial and offset)</li> <li>determine sectional views of truncated geometrical solids</li> <li>establish true shapes of cut surfaces</li> </ul>	<ul style="list-style-type: none"> <li>Interpenetration of geometrical solids and surface developments</li> <li>Sectional views and true shapes of geometrical solids</li> </ul>	<ul style="list-style-type: none"> <li>Constructing surface developments of parts of intersecting solids</li> <li>Determining sectional views of truncated geometrical solids</li> <li>Establishing true shapes of cut surfaces</li> </ul>	<ul style="list-style-type: none"> <li>ICT tools</li> <li>Print media</li> </ul>

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.9.1 Detailed Working Drawing	<ul style="list-style-type: none"> <li>draw detailed floor plans of buildings</li> <li>draw external elevations of buildings</li> <li>draw detailed sectional elevations of buildings</li> </ul>	<ul style="list-style-type: none"> <li>single storey buildings                             <ul style="list-style-type: none"> <li>- Floor plans</li> <li>- Elevations</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Drawing detailed floor plans of buildings</li> <li>Drawing external elevations of buildings</li> <li>Drawing detailed sectional elevations of buildings</li> </ul>	<ul style="list-style-type: none"> <li>ICT tools</li> <li>Print media</li> <li>Field trips</li> </ul>
7.9.2 Community Projects	<ul style="list-style-type: none"> <li>Identify community problems that can be solved by using building drawing</li> <li>take part in drawing community projects</li> </ul>	<ul style="list-style-type: none"> <li>Community building projects</li> </ul>	<ul style="list-style-type: none"> <li>Identifying the community problems</li> <li>Drawing community building projects</li> </ul>	<ul style="list-style-type: none"> <li>ICT tools</li> </ul>

### 7.10 TOPIC 10: MECHANICAL DRAWING

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.10.1 Assembly Drawing	<ul style="list-style-type: none"> <li>assemble components of a given machine</li> <li>draw elevations of the assembled parts</li> <li>draw sectional views of the assembled parts</li> <li>apply mechanical drawing conventions to the assembly drawings</li> <li>draw up a parts list</li> </ul>	<ul style="list-style-type: none"> <li>Assembly drawing                             <ul style="list-style-type: none"> <li>Assembling components</li> </ul> </li> <li>Sections</li> <li>Mechanical drawing conventions</li> <li>Parts list</li> </ul>	<ul style="list-style-type: none"> <li>Assembling components of a given machine</li> <li>Drawing elevations of the assembled parts</li> <li>Drawing sectional views of the assembled parts</li> <li>Applying mechanical drawing conventions in producing the assembly drawing</li> <li>Drawing a parts list</li> </ul>	<ul style="list-style-type: none"> <li>Realia such as components of a machine</li> <li>Print media</li> <li>ICT tools</li> </ul>

### 7.11 TOPIC 11: COMPUTER AIDED DESIGN

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.11.1 3D Forms	<ul style="list-style-type: none"> <li>draw 3D diagrams using advanced drawing commands and tools</li> <li>identify other 3D software</li> </ul>	<ul style="list-style-type: none"> <li>3D forms</li> <li>Other 3D software</li> </ul>	<ul style="list-style-type: none"> <li>Drawing 3D diagrams using advanced drawing commands and tools</li> <li>Identifying other 3D software</li> </ul>	<ul style="list-style-type: none"> <li>ICT tools</li> <li>CAD software</li> <li>Recommended textbooks</li> <li>Resource person</li> </ul>

## 8.0 ASSESSMENT

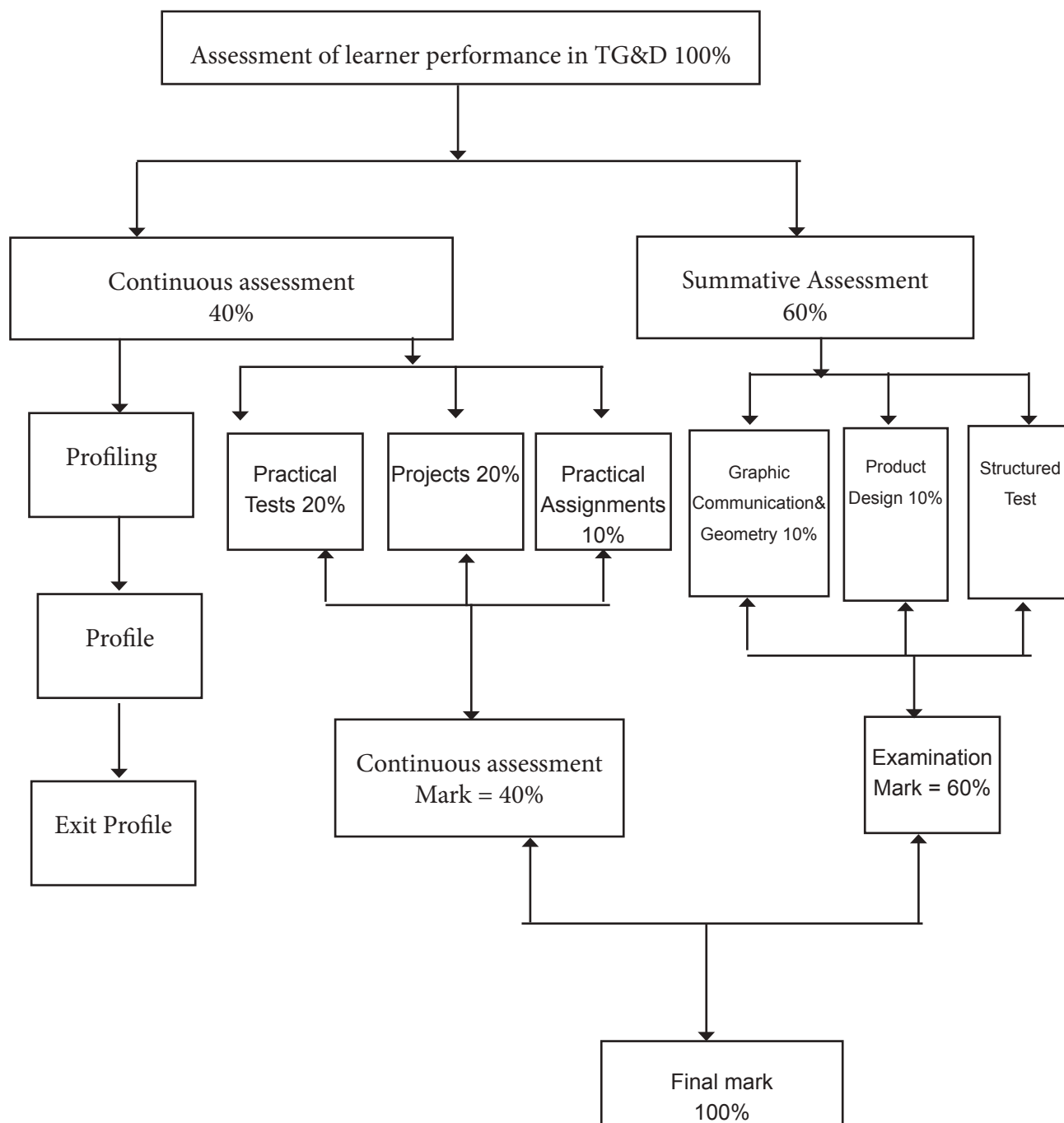
The syllabus scheme of assessment is grounded on the principle of inclusivity. Arrangements, accommodations on the modifications should be visible in both continuous and summative assessments to enable learners/candidates with special needs to access assessments.

(a) Assessment Objectives

By the end of the learning phase, learners will be assessed on the ability to:

- demonstrate the use of a variety of graphical methods in designing and drawing
- apply designing and drawing skills to solve problems in their communities and for enterprise
- use CAD in solving real life problems
- communicate ideas by means of pictorial and orthographic sketches, drawings and models
- produce accurate Geometrical, Mechanical and Building drawings
- use available resources sustainably while conserving the environment
- interpret parts drawings, Mechanical and Building drawings
- apply internationally recognized standards in the production of Mechanical and Building drawings ( PD7308 and Model Building By-laws)

### ASSESSMENT MODEL





**(b) Specification grid**

Objectives/Components	Paper 1	Paper 2	Paper 3	Continuous Assessment
Knowledge with understanding	50	30	20	20
Practical skills and their application	40	50	40	30
Decision making and judgment	10	20	40	50
Total	100	100	100	

Scheme of assessment

**Continuous Assessment**

1 project per year Form 1 – Form 4

Tests – one per term – Form 1 - Form 3

One per term - Form 4 (first two terms)

**Practical Assignments**

1 per term - Form 1 – Form 3

1 per term -Form 4(first two terms)

**Summative Assessment**

**Paper 1** – Graphic Communication and Geometrical Drawing

**Section A** = 40 marks 6 questions compulsory

**Section B** = 60 marks 6 questions. 2 Graphic Communication, 2 Plane Geometry and 2 Solid Geometry.

Answer 4 questions, 1 from each area and 1 from any of the 3 areas

**Paper 2** – Mechanical and Building Drawing

**Section A** = **40 marks** 4 questions compulsory (10 marks each)

**Section B** = **60 marks** 4 questions. 2 from Building Drawing and 2 from Mechanical Drawing.

Answer 1 question

**Paper 3** – Product Design (100 marks)

4 questions. 2 from Building Drawing and 2 from Mechanical Drawing. Answer 1 question





