



EXAMINATIONS COUNCIL OF ESWATINI

TECHNICAL STUDIES SYLLABUS Subject Code: 5925 For Examination in 2025 - 2026

**Eswatini Prevocational
Certificate of Secondary Education
EPCSE**

ESWATINI PREVOCATIONAL CERTIFICATE OF SECONDARY EDUCATION
Technical Studies (5925) October/November 2025 - 2026 Examinations

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ESWATINI PREVOCATIONAL EDUCATION PROGRAMME

Broad Guidelines

The Ministry of Education and Training (MOET) is committed to strengthen and reform the Prevocational Education Programme (National Technical and Vocational Education and Training and Skills Development Policy, 2010) in order to provide equitable access for all students of appropriate age to quality secondary education (Form 4 and 5). The programme and its assessment system prepares the students for:

- their role in the socio-economic life of Eswatini and the world of work and
- further vocational, technical and tertiary education

Eswatini National Education and Training Policy Directives

The Eswatini Prevocational Education Programme in Form 4 and Form 5 offers all students important learning opportunities regardless of their particular chosen programme area. Students in the programme will:

- develop skills that can be applied immediately and in their future activities
- refine career-planning skills
- improve entrepreneurial potential
- acquire technology-related competence
- enhance employability opportunities
- demonstrate increased self-confidence and independence
- apply and reinforce competencies developed in other study areas

The National Curriculum for Form 4 and Form 5

Students are exposed to learning experiences that catalyse the development of basic competencies in all programme areas. These competences include:

- Managing learning
- Independent learning
- Managing resources
- Problem solving and innovation
- Effective communicating
- Working with others
- Responsibility
- Critical thinking
- Technology application

To enhance the development of these skills, students must enrol for the **five academic** core subjects, **two prevocational** core subjects and **one prevocational programme area** chosen from four subjects.

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Academic Core	Prevocational Core	Prevocational Electives
<ul style="list-style-type: none">• SiSwati• English Language• Mathematics• Sciences• Religious Education	<ul style="list-style-type: none">• Entrepreneurship• Information and Communication Technology	<ul style="list-style-type: none">• Agricultural Technology• Business Accounting• Food and Textile Technology• Technical Studies

TECHNICAL STUDIES

The Eswatini Prevocational Certificate of Secondary Education Programme is designed as a two-year course for examination in Form 5. The syllabus is designed to meet the requirements of the Prevocational curriculum guidelines. Assessment guidelines provide a detailed structure to the curriculum and explain how assessment should be developed and carried out as an integral part of practical classroom teaching and learning.

Prevocational Technical Studies is a multidisciplinary subject that will, through the use of student-centred teaching approaches, allow students of various abilities to make use of existing knowledge and initiative to solve day-to-day problems. The Prevocational Technical Studies syllabus will allow students to apply Entrepreneurial and Information and Communication Technological skills to develop necessary knowledge and attitudes.

The Technical Studies syllabus is designed to provide students with a foundation in product design, production processes and opportunities to develop practical skills and knowledge in planning, designing and producing useful products in metal, wood, plastics and graphics communication.

The main sections are:

- Assessment
- Syllabus content
- Grade descriptors
- Appendices

RATIONALE

The Technical Studies course and its assessment system prepare the students for their role in the socio-economic life of Eswatini. Technical Studies is a course of study that can establish the pathway for further education, (self) employment in the field of architecture, engineering, industrial design, etc. The Technical Studies syllabus enables students to identify, consider and solve problems through creative thinking, planning and design, and by working with different materials and tools. Technical Studies contributes directly to the development of skills that include:

- Critical and creative thinking
- Information and communication technology
- Numeracy
- Problem solving
- Self-management and competitiveness
- Social and cooperative skills

AIMS

The aims of the syllabus are the same for all students. The aims are set out below and describe the educational purposes of the course in Technical Studies examination. They are not listed in order of priority.

The aims are to enable students to:

1. use the most appropriate tool, procedure or process to achieve high quality practical outcomes (AO1).
2. apply health and safety principles when using materials, tools and machinery (AO2)
3. understand the basic principles that apply to marketable products (AO2)
4. develop the technical attitudes skills to enable the students to produce a product (AO3)
5. organise the manufacture of a batch of products (AO3)
6. design and make a product to a specification (AO4)

PRIOR KNOWLEDGE

The Programme is designed for students who have successfully completed Eswatini Junior Secondary Education or equivalent.

PROGRESSION

The Prevocational Technical Studies qualification enable candidates to progress directly to gainful employment, self-employment or further education.

TEACHING HOURS

The size of the qualification is described in terms of Guided Learning Hours (GLH) and Total Qualification Time (TQT). The TQT is 180 hours and the GLH is 130 hours over a two year period. GLH is teacher student contact hours which include time spent on teaching, supervising and invigilating. TQT includes GLH, summative assessment and unsupervised learning activities.

SUPPORT DOCUMENTS

A wide range of materials and resources are available to support teachers in Eswatini schools. The resources suit a variety of teaching methods in the local context. Through targeted training forums, teachers can access the expert advice they need for teaching this syllabus.

RECOMMENDED BOOKS:

1. The Motivate series:
 - Technical Drawing with Design
 - Woodwork Technology
 - Metalwork Technology
2. Design and Technology – Colin Caborn, John Cave, Ian Mould
3. Design and Technology – James Garratt

EXAM PREPARATION RESOURCES

Examination reports, syllabuses, past papers and specimen papers are available on ECESWA website www.examsCouncil.org.sz

TRAINING

ECESWA offers training in assessment to ensure that teachers have the relevant knowledge and skills to conduct assessment of learning.

SPECIAL REQUIREMENTS

Workshops/laboratories furnished with functional equipment for conducting practicals.**ASSESSMENT**

This section details the assessment objectives, specification grid, description of papers, scheme of assessment and weighting of papers.

The assessment of the Prevocational Technical Studies follows the Depth of Knowledge (DoK) model developed by Norman Web. The model is preferred over others because it is applied to learning expectations and aligns itself well with the assessment of the Prevocational objectives.

The DoK model is more applicable to the assessment of Prevocational tasks and cognitive demands as it categorises the tasks according to the complexity of thinking required to successfully complete them. It extends beyond **what** is done to **how** it is done.

ASSESSMENT OBJECTIVES (AO)

The Assessment Objectives are categorised as:

- AO1** Recall and reproduction
- AO2** Skills and concepts
- AO3** Strategic thinking
- AO4** Extended thinking

A brief description of the Assessment Objectives

AO1 Recall and reproduction

Involves recall of information and/or rote application of simple procedures. Students are required to demonstrate routine responses, e.g. recall a formula, facts, principles, properties; perform routine tasks, etc.

These are some of the verbs which may be used:

arrange, calculate, define, identify, list, label, copy, state, etc.

AO2 Skills and concepts

This level involves some mental processing beyond simply recalling or reproducing a response. It requires two or more steps in processing of texts or parts of texts. Students will be required to make observations, basic analysis or interpretation of information.

These are some of the verbs which may be used:

illustrate, describe, select, apply, categorise, classify, compare, differentiate, estimate, draw, interpret, organise, predict, sketch, etc.

AO3 Strategic thinking

This level requires a deep knowledge involving more demanding reasoning, planning, using evidence and higher mental processing. It also involves a development of a plan or a sequence of steps. Students are required to justify their interpretations. Items include making interpretations, citing evidence, analysing the use of elements and solutions and proposing elements of a solution. It involves a higher level of thinking than the above two levels.

These are some of the verbs which may be used:

explain, discuss, analyse, assess, critique, develop, justify, hypothesise, investigate, modify, review, solve, etc.

AO4 Extended thinking

At this level the reasoning is more complex. Students are required to use extended or integrated higher order thinking processes such as critical and creative productive thinking, reflection and adjustments of plans over time.

These are some of the verbs which may be used:

compose, create, design, evaluate, judge, propose, formulate, synthesise, etc.

NB: The verbs listed in AO1 to AO4 are meant to enhance the understanding of the DoK model. However, command words that will be used in the syllabus are stated in Appendix 6.

SPECIFICATION GRID

The approximate weightings allocated to each of the assessment objectives are summarised in the table below.

Assessment Objectives	Weighting (%)
(AO1) Recall and reproduction	30
(AO2) Skills and concepts	28
(AO3) Strategic thinking	26
(AO4) Extended thinking	16

Weighting of Papers

The assessment objectives are weighted to give an indication of their relative importance. The percentages are not intended to provide a precise statement of the number of marks allocated to particular objectives.

The table below shows the further percentage breakdown of the assessment objectives for each examination paper.

Paper	Assessment Objectives				Total (%)
	Recall and Reproduction (%)	Skills and concepts (%)	Strategic thinking (%)	Extended thinking (%)	
1	20% (32 marks)	5% (8 marks)			25%
2	10% (29 marks)	15% (42 marks)	10% (29 marks)		35%
3		8% (20 marks)	14% (35 marks) 2% (5 marks)	16% (40 marks)	40%
Total	30%	28%	26%	16%	100%

NB: For Paper 3 the assessment objective (AO3) strategic thinking, the 2% (5 marks) is for the degree of supervision.

SCHEME OF ASSESSMENT

The examination consists of three papers: Paper 1, Paper 2 and Paper 3. Paper 1 consists of multiple choice questions, Paper 2 consists of short, structured and extended questions and Paper 3 is a project. All the three papers are compulsory. Candidates in this syllabus are eligible for grades A* to G.

The appropriate use of ICT and Computer Aided Design (CAD)/Computer Aided Manufacture (CAM) is encouraged throughout the curriculum. The recommended software for examination in this syllabus is **TurboCAD**.

Description of Papers

Paper 1

This is a theory paper comprising 40 multiple choice questions worth 40 marks assessing objectives AO1 and AO2. Duration is 1 hour. This paper contributes 25% to the overall mark.

About 30% of the questions will come from Graphics Communication and 70% will come from Resistant Materials (wood, metal and plastics in equal proportion).

Paper 2

This is a theory paper consisting of short, structured and extended questions worth 100 marks assessing objectives AO1, AO2 and AO3. Duration is 2 hours. This paper contributes 35% to the overall mark.

This paper is divided into two sections: **A** and **B**.

Section A (30 Marks): This section consists of six (6) short answer questions based on the Graphics Communication content assessing objectives AO1 and AO2.

Section B (70 Marks): This section consists of seven (7) structured and extended questions that test skills based on the Resistant Materials content assessing objectives AO2 and AO3.

The theory papers contribute 60% towards the overall syllabus mark.

Paper 3

This paper requires students to complete a school-based project and marks are allocated in three stages which are: a written proposal, product developmental and evaluation. This paper is worth 100 marks assessing objectives AO2, AO3 and AO4. The Project will be assessed by the subject teacher and the external examiner over the duration of the project. The duration of the project is 26 hours from February to October. The candidate's work consists of a portfolio of evidence of the school-based assessment covering the three stages.

The role of the teacher will be to supervise the project. The teacher will award marks based solely on the degree of supervision (e.g. close or minimal supervision) using an assessment criterion in Appendix 2. The overall mark of the Project (Paper 3) is 100 marks where 95 marks are awarded by the examiner and 5 marks awarded by the teacher (95+5=100).

The formula for scaling = $\frac{X}{25} \times 5$.

The teacher's assessment will contribute 2% towards the overall mark of the qualification.

The project will be externally assessed by an examiner who will be appointed by ECESWA. The examiner will be a specialist in the subject area who will not be a classroom teacher. The examiner will assess the project using a confidential assessment criteria developed by ECESWA. The external examiner's assessment will contribute 38% towards the overall mark of the qualification.

The project (Paper 3) will contribute 40% to the overall syllabus mark.

Centres will submit candidates' proposals to ECESWA by 31st March and the portfolio by the 31st October each year for assessment.

Contents of a Portfolio

The portfolio must include sufficient evidence e.g. photographs, write-ups of the projects and any other relevant information to prove originality. The portfolio must include the candidates name, Centre name and candidate number for identification purposes.

GUIDELINES FOR THE PROJECT

The assessment that will contribute to the final grade will begin in Form 5. Information on the assessment will be sent by ECESWA at the beginning of the first term. Thereafter, candidates will begin the first stage of the project.

The Project will be assessed in three (3) stages as follows:

Stage 1-Proposal (written presentation) - 15 Marks

The proposal should include:

- Theme analysis - justification
- Problem statement - identification of a need (gap)
- Methodology - outline of the design of the product (design brief)
- Time frame - anticipated completion dates for each stage of project
- References - list of sources

Each candidate will produce a proposal of between 600 and 800 words. The proposal will be submitted to ECESWA in soft copy (pdf) and hard copy by **31st March** each year. After approval of the proposal by the teacher, candidates may continue with the project before submission of the proposal.

Stage 2-Investigation and development - 70 Marks

This stage includes:

- Research and specifications (15 marks)
- Ideation (10 marks)

- Development and planning (15 marks)
- Realisation (30 marks)

Stage 3-Evaluation - 10 Marks

Testing and evaluation product against pre-set standards (10 marks)

Report submission mode

All reports should be submitted electronically in **pdf** format and as hard copy booklet.

Report presentation format for the project

Font Arial 12 pts, single line spacing, pagination: bottom centre, margins: top and left margin 3 cm, bottom and right 2.54 cm, number of words: 2300-2800, reference style: American Psychology Association (APA)

Submission dates

Proposal in soft copy, pdf format and hard copy-by 31st March of each calendar year.

Portfolio in soft copy, pdf format and hard copy - by 31st October of each calendar year.

CURRICULUM CONTENT

INTRODUCTION

This syllabus area covers two main components which is graphics Communication and Resistant materials. The content under resistant materials is limited to Metals, Woods and Plastics.

The appropriate teaching time for Technical Studies should be equivalent to 5 periods of forty minutes each per week for 52 weeks over the two-year period.

The abbreviations i.e. and e.g. have contextual meaning in this syllabus. Content which follow an i.e. must be taught and content which follow an e.g. indicates that students must know and be able to use as an example.

Abbreviations:

C - content

O - outcome

GRAPHICS COMMUNICATION (GC)

The purpose of this component is to give the student basic foundation that is necessary for Technical Studies skills acquisition.

The syllabus content consists of four Graphics Communication topics that are to be followed by all students. It is envisaged that this course content will be covered in an integrated manner in the teaching of the Resistant Materials content (wood, metal and plastics).

Topic	General objectives: At the end of the programme students can	Students learn about:	Students learn to:
1 Engineering drawings	1.0 draw diagrams that are fundamental in engineering	C1.1 safe and healthy drawing-office practices C1.2 scaled drawings C1.3 orthographic projection i.e.: 1st angle projection 3rd angle projection	O1.1.1 use established safe and healthy drawing-office practices O1.2.1 sketch scaled drawings O1.2.2 produce scaled drawings to size O1.3.1 produce orthographic drawings to illustrate the shape and features of variety of objects in 1 st and 3 rd angle projections

		<p>C1.4 engineering joints connections and other features</p> <p>C1.5 abbreviations and conventional symbols .e.g. BS 308 in engineering</p> <p>C1.6 assembly drawings of products with three or more components</p> <p>C1.7 producing sectional drawings</p> <p>C1.8 preparing working drawings from freehand sketches</p>	<p>O1.4.1 identify engineering joints</p> <p>O1.4.2 draw engineering joints connections and other features</p> <p>O1.5.1 use and apply appropriate abbreviations, engineering conventions and symbols following British Standard (BS 308)</p> <p>O1.6 .1 identify appropriate components for assembly drawings</p> <p>O1.6.2 produce dimensioned, assembled orthographic drawings of exploded components</p> <p>O1.7.1 produce a freehand sectional view</p> <p>O1.7.2 produce a formal sectional view</p> <p>O1.8.1 produce working drawing for projects</p> <p>O1.8.2 produce freehand sketches</p>
2 Geometrical shapes	2.0 draw geometrical drawings that are fundamental to both mechanical and building drafting	<p>C2.1 concept of a circle and its application</p> <p>C2.2 construction of angles i.e. acute, right, obtuse and reflex</p> <p>C2.3 construction of irregular and regular polygons</p> <p>C2.4 geometrical solids</p>	<p>O2.1.1 apply the concept of a circle in any form of drawings which incorporate circles e.g. tangency</p> <p>O2.2.1 construct angles of a given specification</p> <p>O2.2.2 use angles and geometrical shapes to produce specific designs</p> <p>O2.3 1.construct irregular and regular polygons</p> <p>O2.4.1 draw orthographic views of right solids</p> <p>O2.4.2 draw orthographical of inclined solids</p>

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		<p>C2.5 sections, developments and true shapes of truncated prisms, cylinders, right pyramids and cones</p> <p>C2.6 inter-penetration and development of prisms, cylinders, right cones, and pyramids</p>	<p>O2.51 name and identify three dimensional shapes</p> <p>O2.5.2 draw sections and true shapes of truncated prisms and pyramids</p> <p>O2.6.1 sketch inter-penetration and development of prisms, cylinders, right cones and pyramids</p>
<p>3 Pictorial views</p>	<p>3.0 demonstrate knowledge, skills and techniques in converting two dimensional drawings to pictorial freehand and formal drawings</p>	<p>C3.1 free-hand three dimensional sketches</p> <p>C3.2 isometric, and oblique projections of objects containing holes and curves</p> <p>C3.3 one and two-point perspective</p>	<p>O3.1.1 explain concepts involving isometric and oblique projections and one and two-point perspective</p> <p>3.1.2 sketch outlines and develop them into three dimensional drawings</p> <p>O3.2.1 use drawing instruments to produce isometric, oblique or perspective drawings for variety of purposes e.g. converting an orthographic view drawing to pictorial, ideation, explodes views etc</p> <p>O3.3.1 use drawing instruments to produce one and two-point perspective drawings</p>

<p>4 Project planning and design fundamentals</p>	<p>4.1 apply design processes to design and evaluate quality design projects that satisfy identified needs and opportunities</p> <p>4.2 demonstrate skills in research, communication and management in design and production</p> <p>4.3 demonstrate knowledge and understanding of research methods</p> <p>4.4 generate and explore design ideas</p>	<p>C4.1.1 characteristics of project planning and design fundamentals</p> <p>C4.2.1 design situation and design brief</p> <p>C4.3.1 research methods to inform development of specifications and solutions</p> <p>C4.4.1 ideation</p>	<p>O4.1.1.1 list characteristics of project planning and design fundamentals</p> <p>O4.1.1.2 discuss factors affecting design development</p> <p>O4.1.1.3 discuss the characteristics of a successful project</p> <p>O4.2.1.1 identify a need or opportunity.</p> <p>O4.2.1.2 investigate and explore ideas for design development,</p> <p>O4.2.1.3 communicate design ideas and manage production of the major design project</p> <p>O4.3.1.1 describe research methods used in the development of specifications and solutions</p> <p>O4.3.1.2 use appropriate research methods to inform the development and modification of design ideas</p> <p>O4.4.1.1 use a wide range of different, appropriate solutions with imaginative interpretation.</p> <p>O4.4.1.2 evaluate ideas and consider the requirements of the specification.</p> <p>O4.4.1.3 outline different concepts, evaluate them against specification, select the best and develop it further</p>
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	<p>4.5 demonstrate understanding of the elements of a project</p> <p>4.6 demonstrate understanding and application of current and emerging technologies in a variety of settings</p> <p>4.7 conduct testing and evaluation of a product</p>	<p>C4.5.1 elements of project i.e. (i) project timeline (ii) bill of quantities (iii) cost estimate (iv) work schedule</p> <p>C4.6.1 current and emerging technologies to develop and make a product</p> <p>C4.7.1 testing and evaluation</p>	<p>O 4.5.1.1 list the elements of the project</p> <p>O4.5.1.2 discuss elements considered when planning a project.</p> <p>O4.6.1.1 identify and describe the different technologies available</p> <p>O4.6.1.2 apply current and emerging technologies in a variety of settings</p> <p>O4.7.1.1 conducts objective testing and evaluation of the product</p> <p>O4.7.1.2 reports on the analysis of strengths and weaknesses of the product</p> <p>O4.7.1.3 clearly articulates a meaningful conclusion with proposals for further development</p>
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RESISTANT MATERIALS

This area of study is concerned with developing the skills used by designers within the context of materials and their processing. It is intended that practical experience be used to create a broad understanding of materials and their processing rather than an in-depth knowledge of any particular material, technology or process through the following headings:

The general physical and working properties of common resistant materials, i.e., plastic, wood and metal, in relation to specific designing and making tasks; simple comparative testing leading to the reasoned selection of materials and processes for specific design and making tasks.

INTRODUCTORY MODULE

Topic	General objectives: At the end of the programme students can:	Students learn about:	Students learn to:
5 Safety and First Aid	5.0 demonstrate knowledge and understanding of workshop health and safety practices	C5.1 workshop practices, i.e. (i) health and safety (ii) safety rules C5.2 First Aid C5.3 safety signage	O5.1.1 state and comply with appropriate safety rules for a given workshop setting O5.2.1 use First Aid kit O5.3.1 identify and explain safety signs

METALS

The syllabus content in the metal component consists of eleven topics that are to be followed by all students.

The purpose of this component is to provide the students with opportunities to acquire practical knowledge and skills in metal techniques and practices. The specific objectives are to develop candidates, who upon completion of the programme will possess the key employability skills in the metal and engineering industry.

It is recommended that the approach to the objectives should be a practical one wherever possible.

Topic	General objectives: At the end of the programme students can:	Students learn about:	Students learn to:
6 Classification of metals	6.0 demonstrate knowledge, understanding and use of different types of metals	C6.1 metals i.e. (a) ferrous (i) mild steel (ii) cast iron (iii) stainless steel (iv) high speed steel (b) nonferrous i.e.: (i) copper (ii) brass (iii) zinc (iv) tin (v) aluminium (vi) bronze (vii) lead C6.2 physical properties and specific uses of metals C6.3 types and sizes of metals available in the market in Eswatini	O6.1.1 identify and use a range of ferrous and nonferrous metals O6.1.2 distinguish between ferrous and non-ferrous metals O6.1.3 describe the effects of corrosiveness in metals O6.1.4 state the uses of the different types of metals O6.2.1 identify and describe properties of different types of metals O6.2.2 discuss the uses of various forms of metals O6.3.1 distinguish between types and sizes of metals available in the market
7 Hand tools and their uses	7.0 demonstrate knowledge, understanding and application of hand tools	C7.1 marking out and testing tools i.e.: (i) steel rules (ii) measuring tapes (iii) Vernier calliper (iv) engineer's try square (v) scribe (vi) sliding bevel (vii) mitre square (viii) centre punch (ix) odd-leg calliper (x) centre square (xi) micrometer C7.2 cutting tools i.e.: (i) Cold chisels (ii) hacksaw (iii) tin man's snips (iv) files (flat file, hand file round file, square file)	O7.1.1 identify and describe marking out and testing hand tools O7.1.2 state functions of marking out and testing tools O7.1.3 use appropriate marking out and testing tools in a given situation O7.1.4 use drawings to illustrate marking out and testing tools O7.2.1 identify and describe cutting tools O7.2.2 use appropriate cutting tools in a given situation O7.2.3 use drawings to illustrate cutting tools

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		<p>(v) abrasive cutters (grinding, cutting) (vi) combination pliers.</p> <p>C7.3 Percussion tools i.e.: (i) Ball-pane hammer, (ii) mallets (rawhide, rubber)</p> <p>C7.4 holding and supporting tools i.e.: (i) Bench vice (ii) machine and hand vice (iii) self-mole grip</p>	<p>O7.2.4 describe and follow safety rules for using cutting tools</p> <p>O7.3.1 identify, describe and use percussion tools O7.3.2 use appropriate percussion tools in a given situation O7.3.3 use drawings to illustrate tools O7.3.4 describe and follow safety rules for using cutting tools</p> <p>O7.4.1 identify, describe and use holding and supporting tools O7.4.2 use appropriate holding tools in a given situation O7.4.3 use drawings to illustrate holding tools O7.4.4 describe and follow safety rules for using cutting tools</p>
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<p>8 Power tools and machinery</p>	<p>8.0 demonstrate knowledge, understanding and application skills in a variety of stationery machines and portable power tools</p>	<p>C8.1 portable power tools i.e.: (i) angle grinder (ii) hand drill</p> <p>C8.2 machinery i.e.: (i) pedestal/bench drill (ii) pedestal/bench grinder (iii) guillotine (iv) straight bender (v) pipe bender</p>	<p>O8.1.1 describe common features and uses of the powered tools and machines</p> <p>O8.1.2 use sketches to illustrate the use of powered tools and machines</p> <p>O8.1.3 use angle grinder and hand drill</p> <p>O8.2.1 describe common features and uses of a given machinery</p> <p>O8.2.2 selects an appropriate powered tools or machine for a given task</p> <p>O8.2.3 use sketches to illustrate the use of machinery</p> <p>O8.2.4 use the listed machinery pedestal/bench drill, pedestal/bench grinder, guillotine, straight bender, pipe bender</p>
<p>9 Working with metal</p>	<p>9.0 demonstrate knowledge, understanding and application of skills of fundamental metal fabrication</p>	<p>C9.1 metal fabrication processes i.e.: (i) forming/bending (ii) shaping (iii) combining materials (iv) die-casting (v) press forming</p> <p>C9.2 joining methods i.e.: (a) permanent i.e. (i) Riveting (pop rivets countersunk, snap head, pan head) (ii) soft and hard soldering (iii) adhesives. (iv) welding (b) temporary fastenings i.e.: bolt and nut, screws</p>	<p>O9.1.1 state and explain the fabrication processes</p> <p>O9.1.2 bend, shape and combine metals to produce an artefact</p> <p>O9.2.1 state and describe the joining methods</p> <p>O9.2.2 discuss characteristics of permanent and temporary joining methods</p> <p>O9.2.3 describe characteristics of tools and materials used in joining metals</p>

		C9.3 metal fabrication processes i.e.: bending mops, discs and belts	O9.3.1 state and describe metal fabrication processes O9.3.2 select and apply the most appropriate process in a given context
10 Finishes and finishing	10.0 demonstrate knowledge, understanding and application of finishes and finishing techniques.	C10.1 common hazards and precautions when working with metal finishes C10.2 preparation techniques and application of surface treatments C10.3 finishing processes (i) painting (ii) dip coating (iii) electroplating	O10.1.1 identify and describe common hazards and their precautions when working with metal finishes O10.2.1 state and describe finishes and finishing techniques O10.3.1 describe and use the processes of finishing metal surfaces
11 Heat treatment	11.0 demonstrate knowledge and understanding of metal heat treatment processes.	C11.1 heat treatment processes i.e.: (i) hardening (ii) case hardening (iii) tempering (iv) annealing (v) normalising	O11.1.1 state and describe heat treatment processes O11.1.2 explain why the heat treatment processes are performed on metals O11.1.3 discuss how changes in properties occur as a result of heat treatment
12 Welding	12.0 demonstrate knowledge and application of welding skills	C12.1 oxy-acetylene welding health and safety C12.2 functions of oxy-acetylene equipment and accessories C12.3 oxy-acetylene start-up and shut-down procedures C12.4 basic oxy-acetylene welding practice	O12.1.1 state and apply health and safety rules associated with oxy-acetylene welding O12.2.1 describe the function of oxy-acetylene equipment and accessories O12.3.1 state and follow the oxy-acetylene start-up and shut-down procedures O12.4.1 describe the process of producing a welded joint using oxy-acetylene equipment O.12.4.2 describe the visual characteristics of a desirable oxy-acetylene weld

		<p>C12.5 arc welding health and safety</p> <p>C12.6 arc welding practice</p> <p>C12.7 basic arc welding techniques in the flat and vertical position</p>	<p>O12.4.3 use of oxy-acetylene to produce a welded joint</p> <p>O12.5.1 state and apply health and safety rules associated with arc welding</p> <p>O12.6.1 describe the arc welding processes</p> <p>O12.7.1 describe and use basic arc welding techniques for a given position</p> <p>O12.7.2 describe the visual characteristics of a desirable arc weld</p>
<p>13 Lathe work</p>	<p>13.0 demonstrate knowledge and application of lathe work</p>	<p>C13.1 main parts of the metal centre lathe</p> <p>C13.2 lathe accessories i.e: lathe centres, steadies, face plate, catch plate, chucks, dog/carrier</p> <p>C13.3 lathe turning tools i.e facing off, roughing, parting off and boring tools</p> <p>C13.4 turning operations i.e.: (i) parallel and taper turning (ii) Drilling (iii) Knurling (diamond and straight)</p>	<p>O13.1.1 identify and name parts of a centre-lathe</p> <p>O13.2.1 identify and use the different lathe accessories</p> <p>O13.3.1 state the function of each turning tool</p> <p>O13.3.2 state characteristics of turning tools</p> <p>O13.3.3 use the turning tools appropriately</p> <p>O13.4.1 describe the different lathe turning operations</p> <p>O13.4.2 perform the different lathe turning operations to produce an artefact</p>

WOODS

The Wood syllabus content consists of twelve topics that are to be followed by all students.

This area of study is concerned with developing skills applied in the building industry. The Wood specialist area seeks to promote and avail opportunities for students to do some career explorations leading to self-employment or working as a skilled crafts-person for a company/institution in the future.

Topics	General objectives: At the end of the programme students can:	Students learn about:	Students learn to:
14 Classification of timber	14.0 demonstrate knowledge and understanding of different types of woods	C14.1 classification and uses of timber i.e.: (i) softwood e.g. South African Pine (SAP) (ii) hardwoods e.g. Meranti and Saligna C14.2 manufactured boards i.e.: (i) chip board (ii) Medium Density Fibre (MDF) (iii) plywood (iv) block/lamin board (v) melamine board (vi) hardboard	O14.1.1 identify and describe the timber O14.1.2 distinguish between the soft and hardwood O14.1.3 use soft and hardwood to produce an artefact O14.2.1 identify and describe types of manufactured boards O14.2.2 distinguish between the manufactured boards O14.2.3 use manufactured soft and hardwood to produce an artefact O14.2.4 justify appropriate choices for using manufactured board and solid wood used in a particular task
15 Hand tools, and their uses	15.0 demonstrate knowledge, understating and application of hand tools	15. 1 marking out and testing tools i.e.: (i) steel rules (ii) measuring tapes (iii) try square (iv) sliding bevel (v) mitre square (vi) pencil (vii) marking knife (viii) marking/mortise gauge 15.2 cutting tools i.e: (i) firmer/bevel/mortise chisels (ii) Tenon saw (iii) dovetail saw (iv) coping saw (v) rip/cross cut saws (vi) jack/smoothing plane	O15.1.1 identify and describe marking out and testing hand tools O15.1.2 use appropriate marking out and testing tools in a given situation O15.1.3 use drawings to illustrate marking out and testing tools O15.2.1 identify and describe cutting tools O15.2.2 state functions of cutting tools O15.2.3 use appropriate cutting tools in a given situation

		<p>(vii) abrasive papers</p> <p>C15.3 percussion/impelling tools i.e : (i) cross-pane/claw hammer (ii) mallet (iii) flat/Philips screw drivers (iv) Allen keys</p> <p>C15.4 holding tools i.e: (i) bench vice (ii) sash cramp (iii) bench hold fast (iv) bench hook (v) mitre box/cramps (vi) G-cramp</p>	<p>O15.3.1 identify and describe percussion/impelling tools</p> <p>O15.3.2 state function of percussion/impelling tools</p> <p>O15.3.3 use appropriate percussion/impelling tools in a given situation</p> <p>O15.4.1 identify and describe holding tools</p> <p>O15.4.2 state function of holding tools</p> <p>O15.4.3 use appropriate holding tools t in a given situation</p>
16 Power tools and machinery	16.0 demonstrate knowledge, understanding and application skills in a variety of portable power tools and stationery machines	<p>C16.1 power tools i.e.;</p> <p>(i) Jig saw (ii) hand drill (iii) scroll saw (iv) electric planer (v) router (vi) belt/orbital sander (vii) portable circular saw</p> <p>C16.2 stationary machines i.e.:</p> <p>(i) Band saw (ii) circular saw (iii) radial arm saw (iv) wood turning lathe (v) pillar/bench drill (vi) combination planer</p>	<p>O16.1.1 identify and state the function of each portable power tool</p> <p>O16.1.3 use appropriate portable power tools in a given situation</p> <p>O16.2.1 identify and state the function of each machine</p> <p>O16.2.2 use appropriate stationary machines in a given situation</p> <p>O16.2.3 describe the safe use of power tools and machines</p>
17 Working with wood	17.0 demonstrate knowledge, understanding and application of skills of fundamental wood fabrication	<p>C17.1 principles of wood fabrication i.e.</p> <p>(i) laminating (ii) bending/forming (iii) shaping</p> <p>C17.2 nails i.e.:</p> <p>(i) round wire (ii) oval (iii) clout nail (iv) panel pin</p>	<p>O17.1.1 state and explain processes of wood fabrication</p> <p>O17.2.1 identify and describe different types of nails</p> <p>O17.2.2 use appropriate type of nails in a given task</p>

		<p>C17.3 screws i.e.: (i) counter sunk head (ii) round head</p> <p>C17.4 adhesives i.e.: (i) PVA (ii) contact (iii) glue sticks</p> <p>C17.5 joints i.e. (i) carcass (ii) stool (iii) frame</p> <p>C17.6 knock-down fittings: (i) one-piece (ii) two-piece (iii) corner block (iv) cam locks (v) leg fastenings pocket (vi) screwing buttons</p> <p>C17.7 cabinet fittings i.e.: handles (i) hinges (ii) door locks (iii) catches</p>	<p>O17.3.1 identify and describe different types of screws O17.3.2 use appropriate type of screws in a given task</p> <p>O17.4.1 identify and describe different types of adhesives O17.4.2 use appropriate type of adhesives in a given task</p> <p>O17.5.1 identify and describe different types of construction joints O17.5.2 draw and use appropriate type of construction in a given task</p> <p>O17.6.1 identify and describe different types of know-down fittings O17.6.2 draw and use appropriate type of know-down fittings in a given task</p> <p>O17.7.1 identify and describe different types of cabinet fittings O17.7.2 use appropriate type of cabinet fittings in a given task</p>
18 Finishes and finishing	18.0 demonstrate knowledge, understanding and application of finishes and finishing techniques	<p>C18.1 common hazards and precautions when working with wood finishes</p> <p>C18.2 surface preparation techniques e.g. abrasive papers grades</p> <p>C18.3. application of surface treatments i.e.: (i) painting (ii) varnishing (iii) staining</p>	<p>O18.1.1 identify and describe common hazards and their precautions when working with wood finishes</p> <p>O18.2.1 state and describe finishes and finishing techniques</p> <p>O18.3.1 describe the different types of wood finishing processes O18.3.2 select and apply appropriate surface treatments.</p>

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		C18.4 taking care of finishing equipment.	O18.4.1 take care of finishing equipment
19 Doors, windows and frames	19.0 demonstrate knowledge, understanding and application of skills in installing door and window frames	<p>C19.1 types of doors i.e.:</p> <ul style="list-style-type: none"> (i) flush/ hollow core (ii) panelled (iii) ledged, braced and buttoned (iv) framed, ledged, braced and buttoned <p>C19.2 types of windows i.e.:</p> <ul style="list-style-type: none"> (i) louvers (ii) awning (iii) casement (bottom/top/side hung) <p>C19.3 door and window frame materials i.e.:</p> <ul style="list-style-type: none"> steel aluminium wood 	<p>O19.1.1 identify and describe different types of doors</p> <p>O19.1.2 describe and use appropriate techniques in installing door frames and doors</p> <p>O19.2.1 state and explain the purpose of a window</p> <p>O19.2.2 identify and describe different types of windows</p> <p>O19.2.3 sketch and label parts of a window</p> <p>O19.2.4 describe and use appropriate techniques in installing windows</p> <p>O19.3.1 identify and describe different types of door and window frames</p> <p>O19.3.2 describe and use appropriate techniques in installing door and window frames</p>

PLASTICS

The plastic syllabus content consists of two topics that are to be followed by all students.

This area of study is concerned with developing skills applied in the building industry. The plastic specialist area seeks to promote and avail opportunities for students to do some career explorations leading to self-employment or working as a skilled crafts-person for a company/institution as plastic fabricator.

Topics	General objectives: At the end of the programme students can:	Students learn about:	Students learn to:
20 Classification of plastics	20.0 demonstrate knowledge, understanding and use of plastics	C20.1 types of plastics i.e. (i) thermoplastics (ii) thermosetting C20.2 thermoplastics i.e.: (i) acrylic (ii) polyvinyl chloride (PVC) (iii) acrylonitrile-butadiene-styrene (iv) polypropylene (v) polythene (vi) polystyrene C20.3 thermosetting plastics i.e.: (i) polyester resin (ii) glass reinforced plastics (iii) urea formaldehyde (iv) phenol formaldehyde	O20.1.1 state and describe types of plastics O20.1.2 distinguish between thermoplastics and thermosetting plastics O20.2.1 identify and classify the different types of thermoplastics O20.2.2 describe the uses of thermoplastics O20.2.3 use appropriate type of thermoplastic in a given task O20.2.4 describe the uses of thermoplastics O20.3.1 identify and classify the different types of thermosetting O20.3.2 describe the uses of thermosetting O20.3.3 use appropriate type of thermosetting in a given task

<p>21 Tools, and their uses</p>	<p>21.0 demonstrate knowledge, understating and application of tools in plastic fabrication</p>	<p>C21.1 marking out and tools i.e (a) try-square (b) Compass (c) pencil</p> <p>C21.2 cutting out tools and machinery i.e (a) coping saw (b) tenon saw (c) drill (d) file (e) scroll saw (f) jig saw</p>	<p>O21.1.1 identify and describe marking out and testing tools O21.1.2 use appropriate marking out and testing tools in a given situation O21.1.3 use drawings to illustrate marking out and testing tools</p> <p>O21.2.1 identify and describe cutting out tools and machinery O21.2.2 use appropriate cutting out tools and machinery in a given situation O21.2.3 use drawings to illustrate cutting out tools and machinery</p>
<p>22 Working with plastics</p>	<p>22.0 demonstrate knowledge, understanding and application of fundamental skills in plastic fabrication</p>	<p>C22.1 principles of plastic fabrication i.e.: (a) forming: (i) vacuum forming (ii) press forming (b) moulding: (i) injection moulding (ii) blow moulding (c) bending and shaping</p> <p>C22.2 joining plastics (i) bolts and screws (ii) adhesives: tensol cement, PVC and epoxy resin</p> <p>C22.3 cleaning up surfaces and edges (plane, file, abrasive paper, wet and dry, buffing wheel)</p>	<p>O22.1.1 state and describe plastics shaping processes O22.1.2 apply processes used to complete plastic practical projects</p> <p>O22.2.1 state and describe the principles of joining plastics O22.2.2 select appropriate joining method for plastic projects O22.2.3 use principles of joining plastics to complete plastics projects</p> <p>O22.3.1. use appropriate equipment for cleaning plastic edges and surfaces</p>

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		C22.4 surface treatments (a) dyeing (b) painting (c) sand blasting	O22.4.1 describe the different types of surfaces treatments applied on plastics O22.4.2 use appropriate surface treatments on plastics
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GRADE DESCRIPTORS

The scheme of assessment is intended to encourage positive achievement by all candidates. Grade descriptions are provided to give a general indication of the standards of achievement likely to have been shown by candidates awarded particular grades. The grade awarded will depend on the extent to which the candidate has met the assessment objectives overall and may conceal weakness in one aspect of the examination that is balanced by above-average performance on some other.

Prevocational Technical Studies results are shown by one of the grades A*, A, B, C, D, E, F or G indicating the standard achieved, A* being the highest and G the lowest. 'Ungraded' indicates that the candidate's performance fell short of the standard required for grade G.

Criteria for the standard of achievement likely to have been shown by candidates awarded Grades A, C and G are shown below.

A Grade A candidate should be able to:

1. Recall and Reproduction

- (recall knowledge) identify and describe most of the syllabus content presented in a variety of contexts
- (identify, apply and relate procedures) determine, describe fully and apply in an organised safe manner procedures outlined in the syllabus
- (provide explanations) provide a structured and detailed explanation for the majority of the items in the syllabus content
- (reason and predict consequences) predict consequences across a variety of situations, using sound reasoned arguments in a variety of situations
- (show understanding of Technical Studies concepts and principles) recognise, explain and apply Technical Studies concepts and principles across a variety of situations

2. Skills and concepts

- (recall problems) assess a familiar situation and recognise its principal needs and compose a design brief and specification, with some understanding of precision and prescription
- (analyse problems) systematically seek to identify and evaluate information and factors in a design situation concerning:
 - (i) user needs, ergonomic and functional modes of use
 - (ii) environments, locations and changes within each
 - (iii) the availability and effect of materials and manufacturing processes
 - (iv) the factors in the identity of a product: appearance, efficiency, and compatibility
- (envisage solutions) produce ideas for solutions, which are varied in form and detail and occasionally innovative, and apply sound judgements regarding feasibility and appreciate implications for brief, specification and production

- (refine and develop a solution) systematically develop and modify proposals or ideas in relation to appearance, cost, efficiency and feasibility, taking into account the manufacturing process
- (evaluate and test a solution) accept evaluation as a feature of all design stages and show detachment in making judgements and seeking evaluation techniques as well as offer sensible modifications for improving a feature

3. Strategic thinking

- (recognise and transform) seek, recognise and transform information in an effective and economical manner across a variety of application forms
- (select means of communication) select and discriminate between those communication methods, which are the most appropriate and effective for transmitting ideas, and information
- (convey information) convey information appropriately, precisely and concisely
- (convey ideas) convey a sequence of ideas in a fluent manner by the most appropriate means
- (represent detail) represent detail of a form with clarity and precision, taking full account of appropriate conventions

4. Extended thinking

- (plan for realisation) plan for realisation in related stages, pursued in a logical sequence leading to full completion when viewed against the designed solution
- (select resources) select from the range of resources which she/he judges to be the most appropriate after researching characteristics, investigating suitability and checking availability and cost
- (select tools and processes) select from the range of tools, instruments and processes available those which are appropriate and effective to achieve an efficient realisation
- (demonstrate transformation skills) apply manipulative or graphic skills with sufficient precision to make a product which closely reproduces the detail given in the designed solution
- (evaluate process and product quality) make detailed statements demonstrating an insight and awareness of and response to weakness of the aesthetic, functional and technical characteristics of the product, proposing appropriate modifications where required

A Grade C candidate should be able to:

1. Recall and Reproduction

- (recall knowledge) identify and describe with accuracy and understanding a wide range of items outlined in the syllabus
- (identify, apply and relate procedures) identify, describe with some detail and relevance and apply a wider range of procedures, including evidence of safe practice, as outlined in the syllabus
- (provide explanations) make detailed explanation, generally substantiated, of aspects covering a range of the syllabus
- (reason and predict consequences) predict consequences with some accuracy, giving reasons, based on evidence available
- (show understanding of Technical Studies concepts and principles) provide simple explanations reflecting an understanding of basic Technical Studies concepts and principles

2. Skills and concepts

- (recall problems) examine a familiar situation and identify some real needs, compose a brief and draw up a specification
- (analyse problems) gather relevant information and apply it meaningfully to the active exploration of factors such as:
 - (i) a variety of user needs
 - (ii) the influences different environments have
 - (iii) the effect of resources and processes
 - (iv) products with similar or related functions
- (envisage solutions) generate alternative forms of solution and propose some variation within one form
- (refine and develop a solution) show progression in developing a proposal or idea and consider modifications in relation to appearance, cost efficiency and feasibility
- (evaluate and test a solution) evaluate the end product in terms of the brief with respect to function, appearance, cost and overall performance

3. Strategic thinking

- (recognise and transform) seek readily available and clearly defined information and transfer this information efficiently into other suitable forms
- (select means of communication) select communication methods, which will clearly transmit ideas and information
- (convey information) convey information clearly using an appropriate technical vocabulary
- (convey ideas) convey ideas with clarity in a structured and appropriate manner
- (represent detail) represent details of a form with some accuracy and precision and using a range of conventions

4. Extended thinking

- (plan for realisation) plan for realisation in related stages pursued in a sequence leading to sensible completion when viewed against the designed solution
- (select resources) select from the range of resources which she/he judges to be the most appropriate after consideration of suitability, availability and cost
- (select tools and processes) select from any immediately available range of tools, instruments and processes those which are appropriate to achieve realisation
- (demonstrate transformation skills) apply manipulative or graphic skills accurately enough to make a product which meets a significant proportion of the designed solution
- (evaluate process and product quality) make statements demonstrating an appreciation of any strengths and weaknesses of some of the aesthetic, functional and technical characteristics of the product, making simple modifications where required

A Grade G candidate should be able to:

1. Recall and Reproduction

- (recall knowledge) name, where shown, some of the items outlined in the syllabus and recall knowledge about them
- (identify, apply and relate procedures) name and recall, when shown, some of the procedures, including safety, which are outlined in the syllabus
- (provide explanations) make elementary statements about some aspects of knowledge outlined in the syllabus
- (reason and predict consequences) produce statements based on experience
- (show understanding of Technical Studies concepts and principles) recognise similarities between related aspects of Technical Studies

2. Skills and concepts

- (recall problems) interpret a given brief in a simple manner and recognise rudimentary aspects of a situation
- (analyse problems) engage in one of the following typical procedures:
 - (i) gather some relevant information from readily available sources
 - (ii) explore a category of user need
 - (iii) consider aspects of use in a particular location
 - (iv) investigate a range of resource options
 - (v) consider straightforward aspects of the problem
- (envisage solutions) envisage one type or form of solution
- (refine and develop a solution) suggest modifications to a proposal and be aware of cost as a factor
- (evaluate and test a solution) make simple statements about the end product

3. Strategic thinking

- (recognise and transform) recognise and change elementary forms of spoken, tactile, visual and written information, which are related to everyday examples expressed in concrete and real ways
- (select means of communication) select from a previously experienced elementary range of communication methods, those she/he considers to be appropriate for the transmission of ideas and information
- (convey information) convey elementary information with some clarity using simple technical vocabulary
- (convey ideas) convey ideas in an elementary form
- (represent detail) represent form by a recognisable outline

4. Extended thinking

- (plan for realisation) respond to planning suggestions in an order influenced by experience and personal transformation skills
- (select resources) select from a previously experienced range of resources which she/he considers to be appropriate
- (select tools and processes) select from a range of previously experienced tools, instruments and processes those which she/he identifies as adequate to achieve the intended realisation
- (demonstrate transformation skills) apply rudimentary manipulative or graphic skills, resulting in a realisation which meets some aspects of the designed solution
- (evaluate process and product quality) make simple statements demonstrating awareness of some of the aesthetic, functional and technical characteristics of the product

PROJECT ASSESSMENT

Introduction

The project (Paper 3) will be based on the given theme, interests and observations of the candidates to arrive at a project that identifies a real design need and which is within the scope of the candidate in terms of both time and ability. The candidate's work consists of a portfolio of evidence of the school-based assessment covering the three stages.

The overall mark of the Project (Paper 3) is 100 marks where 95 marks are awarded by the external examiner and 5 marks are awarded by the teacher (95+5=100). The teacher's assessment is marked out of 25 and scaled down using the formula $\frac{X}{25} \times 5$.

The Project will be assessed by the subject teacher and the external examiner over the duration of the project. The external examiner will assess each stage of the project using a confidential assessment criteria developed by ECESWA whilst the teacher's assessment will be on the degree of supervision (e.g. close or minimal supervision) of the candidate.

Role of subject teacher

The teacher has a major role in helping students to formulate ideas and act as an advisor throughout the project. In order to assess supervision of students' work, teachers will complete a checklist form. The teacher must regularly check the progress and content of candidates' work and check candidates' understanding of the material they have used. The teacher must also ensure that the work submitted for marking is the candidates' own work. The teacher's assessment will contribute 2% towards the weighting of the qualification.

Role of external examiner

In competence based assessments, the role of external examiner is essential. A very close monitoring is essential in view of ensuring that reliability and comparability of standards can be maintained to the levels of external examinations.

The external examiner will make two visits to the Centres.

- Visit 1: Examiner will bring feedback on stage 1 (proposal) and monitor candidates' progress.
- Visit 2: after the completion of the project the examiner will visit Centres to assess the finished product while the portfolio will be assessed at ECESWA.

The external examiner's assessment will contribute 38% towards the weighting of the paper.



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Appendix 1: Technical Studies Paper 3 – Assessment Summary Sheet

Centre Name		Centre Number	S	Z					Year				
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		Stage 1	Stage 2				Stage 3		Final Grade (out of 100 Marks)
		Proposal	Implementation				Evaluation		
Candidate Number	Candidate Name	Written 15 Marks	Research and specification 15 Marks	Ideation 10 Marks	Development and planning for production 15 Marks	Realisation 30 Marks	Evaluation 10 Marks	Teacher supervision 5 Marks	

Teacher's Name		Date	D	D	M	M	Y	Y	Y	Y	Contact Number (s)	
Examiner's Name		Date	D	D	M	M	Y	Y	Y	Y	Contact Number (s)	

Appendix 2: Teacher Assessment Criteria

Introduction

The Project (Paper 3) will be assessed by the subject teacher and the external examiner over the duration of the project. The teacher’s assessment will be on the degree of supervision (e.g. close or minimal supervision) of the candidate and will contribute 2% towards the overall mark of the qualification. The external examiner’s assessment will contribute 38% towards the overall mark of the Project.

The formula for scaling is: $\frac{x}{25} \times 5$

Teacher Assessment Criteria

25 Marks

Stage 1: Proposal 5 Marks

	Guidance	Marks
Worked mainly independently to produce the proposal. Worked with some guidance to produce the proposal.	Award 5 marks for working mainly independently to produce the proposal. Award 4 marks for working with some guidance to produce the proposal.	4 - 5
Needed average guidance to produce the proposal. Needed considerable guidance to produce the proposal.	Award 3 marks for average guidance to produce the proposal. Award 2 marks for working with above average guidance in producing the proposal.	2 - 3
Needed fair guidance to produce the proposal. Needed maximum guidance to produce the proposal	Award 1 mark for fair guidance to produce the proposal. Award 0 marks for maximum guidance to produce the proposal.	0-1

Stage 2: Investigation and Development 15 Marks

(i) Research, Specification and Ideation

5 Marks

		Marks
<p>Worked mainly independently in writing the research, specifications and ideation.</p> <p>Worked with some guidance in writing the research, specification and ideas.</p>	<p>Award 5 marks for working mainly independently in researching, specification and ideation.</p> <p>Award 4 marks for working with some guidance in researching, specification and ideation.</p>	4 - 5
<p>Needed average guidance in writing the research, specifications ideation.</p> <p>Needed considerable guidance in writing the research, specification and ideation.</p>	<p>Award 3 marks for working with average guidance in producing the research, specification and ideation.</p> <p>Award 2 marks for working with considerable guidance in producing the research, specification and ideation.</p>	2 - 3
<p>Needed fair guidance in writing the research, specifications ideation.</p> <p>Needed maximum guidance in writing the research, specifications ideation.</p>	<p>Award 1 mark for fair guidance in researching, specification and ideation.</p> <p>Award 0 marks for maximum guidance in researching, specification and ideation.</p>	0 - 1

(ii) Development and planning for production 5 Marks

	Guidance	Marks
<p>Worked mainly independently in carrying out development and planning for production.</p> <p>Worked with some guidance in carrying out development and planning for production.</p>	<p>Award 5 marks for working mainly independently in carrying out development and planning for production.</p> <p>Award 4 marks for working with some guidance in carrying out development and planning for production.</p>	4 - 5
<p>Needed average guidance in carrying out development and planning for production.</p> <p>Needed considerable guidance in carrying out development and planning for production.</p>	<p>Award 3 marks for average guidance in the in carrying out development and planning for production.</p> <p>Award 2 marks for considerable guidance in in carrying out development and planning for production.</p>	2 - 3
<p>Needed fair guidance in carrying out development and planning for production.</p> <p>Needed maximum guidance in carrying out development and planning for production.</p>	<p>Award 1 mark for fairly guidance in carrying out development and planning for production.</p> <p>Award 0 marks for maximum guidance in in carrying out development and planning for production.</p>	0 - 1

(iii) Realisation

5 marks

	Guidance	Marks
<p>Worked mainly independently in carrying out the realisation process.</p> <p>Worked with some guidance in carrying out the realisation process.</p>	<p>Award 5 marks for working mainly independently in carrying out the realisation process.</p> <p>Award 4 marks for working with some guidance in carrying out the realisation process.</p>	4 – 5
<p>Needed average guidance in carrying out the realisation process.</p> <p>Needed considerable guidance in carrying out the realisation process.</p>	<p>Award 3 marks for average guidance in carrying out the realisation process.</p> <p>Award 2 marks for considerable guidance in carrying out the realisation process.</p>	2 - 3
<p>Needed fair guidance in carrying out the realisation process.</p> <p>Needed maximum guidance in carrying out the realisation process.</p>	<p>Award 1 mark for fair guidance in in carrying out the realisation process.</p> <p>Award 0 marks for maximum guidance in in carrying out the realisation process.</p>	0 - 1

Stage 3: Testing and Evaluation

5 Marks

	Guidance	Marks
<p>Worked independently in testing and evaluation of the product.</p> <p>Worked with some guidance in testing and evaluation of the product.</p>	<p>Award 5 marks for working mainly independently in testing and evaluation of the product.</p> <p>Award 4 marks for working with some guidance in testing and evaluation of the product.</p>	4 - 5
<p>Needed average guidance in testing and evaluation of the product</p> <p>Needed considerable guidance in testing and evaluation of the product</p>	<p>Award 3 marks for average guidance in testing and evaluation of the product</p> <p>Award 2 marks for considerable guidance in testing and evaluation of the product.</p>	2 - 3
<p>Needed fair guidance in testing and evaluation of the product.</p> <p>Needed maximum guidance in testing and evaluation of the product.</p>	<p>Award 1 mark for fairly guidance in testing and evaluation of the product.</p> <p>Award 0 marks for maximum guidance in testing and evaluation of the product.</p>	0 - 1

Appendix 3: Technical Studies Paper 3 – Assessment Summary Sheet for Teachers

LEVEL OF SUPERVISION

Centre Name		Centre Number	S	Z						Year				
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The overall mark is $95+5 = 100$ (where 5 marks are awarded by the teacher and 95 marks by the examiner. The scaling formula: $\frac{x}{25} \times 5$)

NB: In case of a decimal after scaling the mark should be rounded down.

Candidate Number	Candidate Name	Stage 1	Stage 2			Stage 3	Total Marks	Scaled Marks
		Proposal	Investigation and development			Evaluation		
		Write up	Research, Specification and Ideation	Development and Planning for Production	Realisation	Testing and evaluation		
		5 Marks	5 Marks	5 Marks	5 Marks	5 Marks	25 Marks	

Teacher's Name		Date	D	D	M	M	Y	Y	Y	Y	Contact Number (s)	
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Appendix 4: Declaration Form

A: Student

Iconfirm that the material is all my work. I have not copied or based my work on samples or exemplars to which I have had access. Any work taken from another source has been appropriately referenced and acknowledged. I am not resubmitting previously submitted work.

Signature Date

B: Teacher

Iverify that I have supervised work to enable me to say with confidence that this is the candidate's own work. The work has been fully checked and these checks included looking for: copying from any sample/exemplar materials; copying from other students; the possibility of a third person preparing the work; resubmission of previously submitted work.

Signature.....Date.....

Appendix 5: Glossary of Technical Studies terminology

Design Process

ANALYSIS	A questioning of the brief to find out what it could mean.
ANTHROPOMETRIC DATA	Body measurements taken from large numbers of people.
BRIEF	A statement of the design problem.
ERGONOMICS	Recommended dimensions of objects based on anthropometric data.
EVALUATION	An assessment of the completed project and the processes involved.
INVESTIGATION/ RESEARCH	Reading and experimenting to gather information about the problem. May also involve 'market research', internet searches, etc.
MANUFACTURE	The process of making the designed project.
PROTOTYPING	Making models to test design ideas.
SPECIFICATION	A statement of the design problem and all the factors that might be linked to it.

Graphics Communication

ASSEMBLY DRAWING	One or a series of drawings indicating how and in what order the parts are assembled.
CUTAWAY DRAWING	A drawing in which a part is removed to show the inner detail.
ELEVATION	An orthographic view of the front, rear, or end of an object.
EXPLODED DRAWING	A drawing in which the parts are separated so that each can be clearly seen.
ISOMETRIC PROJECTION	An isometric drawing shows two sides of the object and the top or bottom of the object. All vertical lines are drawn vertically, but all horizontal lines are drawn at 30 degrees to the horizontal. Isometric is an easy method of constructing a reasonable '3 dimensional' images.
OBLIQUE PROJECTION	A 3D drawing system which views one face of the object as a 'true shape' and projects parallel lines from it to suggest solidity.
ORTHOGRAPHIC PROJECTION	An organised series of flat views of an object, drawn so that all the details can be clearly seen. There are two types 1 st and 3 rd angle. These will show a plan view and, usually, front and side elevations.
PERSPECTIVE	A3D drawing system which produces a realistic image of the object. This appears to get smaller as it recedes into the picture space. There are three types - single point, two point, and three point.
PLAN	An orthographic view of the object seen from above.

RENDERING	Making a line drawing appear more realistic by applying tone, line, texture, or colour shading.
SECTIONAL VIEWS	These are used to show hidden detail more clearly. They are created by using a cutting plane to cut the object. A section is a view of no thickness and shows the outline of the object at the cutting plane. Visible outlines beyond the cutting plane are not drawn.

Aesthetics

COLOUR THEORY	An explanation as to how colours (hues) are related to each other and how they are made darker (shaded) or lighter (tinted).
FINISH	The surface treatment of a material. This ranges from matt (dull) to glossy (shiny) and can include the application of materials such as paint, lacquer or varnish.
FORM	A 3D shape.
PATTERN	This usually refers to surface decoration which can be applied using colour or texture.
PROPORTION	The relative size of objects or the relationship of their parts.
SHAPE	An area enclosed by an outline. This can be geometric (drawn with instruments) or organic (based on natural object).
STYLISING	Emphasising a feature of a shape or form.
TEXTURE	The surface quality of a material, this can be coarse (rough) or fine (smooth).

Resistant Materials

ALLOY	A mixture of two or more metals.
BLOW MOULDING	Can be Injection or Extrusion Blow Moulding. Both involve the use of compressed air to form hollow objects within a mould.
DEFORMING	Also called forming, shaping a material by pushing or pulling it into a three dimensional form.
EXTRUSION	A method of forming long continuous sections of metal and thermoplastic.
FERROUS METAL	A metal which contains iron (Non-ferrous metals contain no iron).
INJECTION MOULDING	Hot plastic is injected into a mould where it cools and solidifies into the required shape.
LAMINATING	Thin strips of material are glued together to form thick sections or shaped objects.
THERMOPLASTICS	A plastic that can be softened by heat.

THERMOSET	A plastic that cannot be softened with heat.
VACUUM FORMING	A thermoplastic sheet is heated until soft then sucked onto a mould by pumping out the air from the mould chamber.
VENEER	A thin sheet of timber.

Appendix 6: Glossary of command words

It is hoped that the glossary will prove helpful to candidates as a guide i.e., it is neither exhaustive nor definitive. The glossary has been deliberately kept brief with respect to the number of terms included but also to the descriptions of their meanings. Candidates should appreciate that the meaning of a term must depend, in part, on its context.

In all questions, the number of marks allocated is shown on the examination paper, and should be used as a guide by candidates to how much detail to give or time to spend in answering. In describing a process, the mark allocation should guide the candidate about how many steps to include. In explaining why something happens, it guides the candidate on how many reasons to give, or how much detail to give for each reason.

CALCULATE Used when a numerical answer is required. In general, working should be shown, especially where two or more steps are involved.

COMPLETE Usually refers to a drawing to which more detail and/or notes need to be added.

DEFINE (the term(s) ...) is intended literally, only a formal statement or equivalent paraphrase being required.

DESCRIBE Requires the candidate to state in words (using diagrams where appropriate) the main points of the topic. It is often used with reference to data or information given in a graph, table or diagram, requiring the candidate to state the key points that can be seen in the stimulus material. Where possible, reference should be made to numbers drawn from the stimulus material. It can also require a candidate to give a step by step written statement of what happens during a particular process. In other contexts, describe should be interpreted more generally (i.e., the candidate has greater discretion about the nature and the organisation of the material to be included in the answer). "Describe and explain" may be coupled, as may "State and explain".

DESIGN Produce ideas and/or drawings showing how a product is to be made and how it will work and look.

DETERMINE Often implies that the quantity concerned cannot be measured directly but is obtained by calculation, substituting measured or known values of other quantities into a standard formula (e.g., the Young modulus, relative molecular mass).

DRAW Make a picture or illustration

ESTIMATE	Implies a reasoned order of magnitude statement or calculation of the quantity concerned, making such simplifying assumptions as may be necessary about points of principle and about the values of quantities not otherwise included in the question.
EVALUATE	To judge or calculate the quality, importance, amount or value of something based on the evidence.
EXPLAIN	May imply reasoning or some reference to theory, depending on the context. It is another way of asking candidates to give reasons for. The candidate needs to leave the Examiner in no doubt why something happens.
FIND	Is a general term that may variously be interpreted as “Calculate”, “Measure”, “Determine”, etc.
GIVE	A reason or reasons is another way of asking candidates to explain why something happens.
LIST	Requires a number of points, generally each of one word, with no elaboration. Where a given number of points is specified this should not be exceeded.
MEASURE	Implies that the quantity concerned can be directly obtained from a suitable measuring instrument (e.g., length, using a rule, or mass, using a balance).
NAME	Requires a short answer, often just one word and is sometimes used in place of ‘State’.
OUTLINE	Implies brevity (i.e., restricting the answer to giving essentials).
PREDICT	Implies that the candidate is not expected to produce the required answer by recall but by making a logical connection between other pieces of information. Such information may be wholly given in the question or may depend on answers extracted in an earlier part of the question. Predict also implies a concise answer with no supporting statement required.
SKETCH	In diagrams, sketch implies that simple, freehand drawing is acceptable; nevertheless, care should be taken over proportions and the inclusion of important details.
STATE	Implies a concise answer with little or no supporting argument (e.g., a numerical answer that can readily be obtained 'by inspection').

SUGGEST Used in two main contexts (i.e., either to imply that there is no unique answer (e.g., in Chemistry, two or more substances may satisfy the given conditions describing an 'unknown'), or to imply that candidates are expected to apply their general knowledge to a 'novel' situation, one that may be formally 'not in the syllabus').

WHAT “What do you understand by”/ “What is meant by” (the term (s) ...) normally implies that a definition should be given, together with some relevant comment on the significance or context of the term(s) concerned, especially where two or more terms are included in the question. The amount of supplementary comment intended should be interpreted in the light of the indicated mark value.

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