



higher education
& training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATES (VOCATIONAL)

ASSESSMENT GUIDELINES

FITTING AND TURNING

NQF LEVEL 2

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SECTION A: PURPOSE OF THE ASSESSMENT GUIDELINES

This document provides the lecturer with guidelines to develop and implement a coherent, integrated assessment system for the subject *Welding Level 2* in the National Certificates (Vocational). It must be read with the *National Policy Regarding Further Education and Training Programmes: Approval of the Documents, Policy for the National Certificates (Vocational) Qualifications at Levels 2 to 4 on the National Qualifications Framework (NQF)*. This assessment guideline will be used for National Qualifications Framework Levels 2-4.

This document explains the requirements for the internal and external subject assessment. The lecturer must use this document with the *Subject Guidelines* to prepare for and deliver *Welding Level 2*. Lecturers should use a variety of resources and apply a range of assessment skills in the setting, marking and recording of assessment tasks.

SECTION B: ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)

1 ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)

Assessment in the National Certificates (Vocational) is underpinned by the objectives of the National Qualifications Framework (NQF). These objectives are to:

- Create an integrated national framework for learning achievements.
- Facilitate access to and progression within education, training and career paths.
- Enhance the quality of education and training.
- Redress unfair discrimination and past imbalances and thereby accelerate employment opportunities.
- Contribute to the holistic development of the student by addressing:
 - social adjustment and responsibility;
 - moral accountability and ethical work orientation;
 - economic participation; and
 - nation-building.

The principles that drive these objectives are:

- **Integration**

To adopt a unified approach to education and training that will strengthen the human resources and develop the capacity of the nation.

- **Relevance**

To be dynamic and responsive to national development needs.

- **Credibility**

To demonstrate recognition of competencies and skills acquired, national and international added value and recognition of the acquired qualification

Coherence

To work within a consistent framework of principles and certification.

- **Flexibility**

To allow for creativity and resourcefulness when achieving Learning Outcomes, to cater for different learning styles and use a range of assessment methods, instruments and techniques.

- **Participation**

To enable stakeholders to participate in the setting of standards and the co-ordination of the achievements required for the qualification.

- **Access**

To address barriers to learning experienced on different levels and to facilitate the students' progress.

- **Progression**

To ensure the qualification framework permits individuals to move through the levels of the national qualification via different, appropriate combinations of the components of the delivery system.

- **Portability**

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To enable students to transfer credits obtained within a qualification from one learning institution and/or employer to another institution or employer.

- **Articulation**

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To allow for vertical and horizontal mobility in the educational system on condition that accredited pre-requisites have been successfully completed.

- **Recognition of Prior Learning**

To grant credits for a unit of learning following an assessment process or where a student possesses the capabilities as specified in the outcomes.

- **Validity of assessments**

To ensure assessment covers a broad range of knowledge, skills, values and attitudes (SKVAs) needed to demonstrate applied competency. This is achieved through:

- clearly stating the outcome to be assessed;
- selecting the appropriate or suitable evidence;
- matching the evidence with a compatible or appropriate method of assessment; and
- selecting and constructing an instrument(s) of assessment.

Topics should be assessed individually and then cumulatively with other topics. There should be a final summative internal assessment prior to the external assessment.

- **Reliability**

To assure assessment practices are consistent so that the same result or judgment is arrived at if the assessment is replicated in the same context. This demands consistency in the interpretation of evidence; therefore, careful monitoring of assessment is vital.

- Cumulative and summative assessments must be weighted more than single topic tests for the internal mark.
- There should be at least one standardised or norm test in each term
- All standardised or norm tests must be moderated by a subject specialist.

- ***Fairness and transparency***

To verify that assessment processes and/or method(s) used neither hinders nor unfairly advantage any student. The following could constitute unfairness in assessment:

- Inequality of opportunities, resources or teaching and learning approaches
- Bias based on ethnicity, race, gender, age, disability or social class
- Lack of clarity regarding Learning Outcome being assessed
- Comparison of students' work with other students, based on learning styles and language

Assessment in Mathematics must take into consideration that the process or method carries more weight than the final answer.

- ***Practicability and cost-effectiveness***

To integrate assessment tasks and/practices within an outcomes-based education and training system to strive for cost and time-effective assessment.

2 ASSESSMENT FRAMEWORK FOR VOCATIONAL QUALIFICATIONS

The assessment structure for the National Certificates (Vocational) qualification is as follows:

2.1 Internal continuous assessment (ICASS)

Knowledge, skills values, and attitudes (SKVAs) are assessed throughout the year using assessment instruments such as projects, tests, assignments, investigations, role-plays and case studies. The ICASS practical component is undertaken in a real workplace, a workshop or a “*Structured Environment*”. This component is moderated internally and quality assured externally by Umalusi. All internal continuous assessment (ICASS) evidence is kept in a Portfolio of Evidence (PoE) and must be readily available for monitoring, moderation and verification purposes.

2.2 External summative assessment (ESASS)

The ESASS is either a single or a set of written papers set to the requirements of the Subject Learning Outcomes. The Department of Higher Education and Training administers the theoretical component according to relevant assessment policies.

A compulsory component of ESASS is the **integrated summative assessment task (ISAT)**. This assessment task draws on the students' cumulative learning throughout the year. The task requires **integrated application of competence** and is executed under strict assessment conditions. The task should take place in a simulated or “*Structured*”

Environment". The ISAT is the most significant test of students' ability to apply their acquired knowledge.

The integrated assessment approach allows students to be assessed in more than one subject with the same ISAT.

External summative assessments will be conducted annually between October and December, with provision made for supplementary sittings.

3 MODERATION OF ASSESSMENT

3.1 Internal moderation

Assessment must be moderated according to the internal moderation policy of the Further Education and Training (FET) college. Internal college moderation is a continuous process. The moderator's involvement starts with the planning of assessment methods and instruments and follows with continuous collaboration with and support to the assessors. Internal moderation creates common understanding of Assessment Standards and maintains these across vocational programmes.

3.2 External moderation

External moderation is conducted by the Department of Higher Education and Training, Umalusi and, where relevant, an Education and Training Quality Assurance (ETQA) body according to South African Qualifications Authority (SAQA) and Umalusi standards and requirements.

The external moderator:

- monitors and evaluates the standard of all summative assessments;
- maintains standards by exercising appropriate influence and control over assessors;
- ensures proper procedures are followed;
- ensures summative integrated assessments are correctly administered;
- observes a minimum sample of ten (10) to twenty-five (25) percent of summative assessments;
- gives written feedback to the relevant quality assessor; and
- moderates in case of a dispute between an assessor and a student.

Policy on inclusive education requires that assessment procedures for students who experience barriers to learning be customised and supported to enable these students to achieve their maximum potential.

4 PERIOD OF VALIDITY OF INTERNAL CONTINUOUS ASSESSMENT (ICASS)

The period of validity of the internal continuous assessment mark is determined by the *National Policy on the Conduct, Administration and Management of the Assessment of the National Certificates (Vocational)*.

The ICASS must be re-submitted with each examination enrolment for which it constitutes a component.

5 ASSESSOR REQUIREMENTS

Assessors must be subject specialists and a competent assessor

6 TYPES OF ASSESSMENT

Assessment benefits the student and the lecturer. It informs students about their progress and helps lecturers make informed decisions at different stages of the learning process. Depending on the intended purpose, different types of assessment can be used.

6.1 Baseline assessment

At the beginning of a level or learning experience, baseline assessment establishes the knowledge, skills, values and attitudes (SKVAs) that students bring to the classroom. This knowledge assists lecturers to plan learning programmes and learning activities.

6.2 Diagnostic assessment

This assessment diagnoses the nature and causes of learning barriers experienced by specific students. It is followed by guidance, appropriate support and intervention strategies. This type of assessment is useful to make referrals for students requiring specialist help.

6.3 Formative assessment

This assessment monitors and supports teaching and learning. It determines student strengths and weaknesses and provides feedback on progress. It determines if a student is ready for summative assessment.

6.4 Summative assessment

This type of assessment gives an overall picture of student progress at a given time. It determines whether the student is sufficiently competent to progress to the next level.

7 PLANNING ASSESSMENT

An assessment plan should cover three main processes:

7.1 Collecting evidence

The assessment plan indicates which Subject Outcomes and Assessment Standards will be assessed, what assessment method or activity will be used and when this assessment will be conducted.

7.2 Recording

Recording refers to the assessment instruments or tools with which the assessment will be captured or recorded. Therefore, appropriate assessment instruments must be developed or adapted.

7.3 Reporting

All the evidence is put together in a report to deliver a decision for the subject.

8 METHODS OF ASSESSMENT

Methods of assessment refer to who carries out the assessment and includes lecturer assessment, self-assessment, peer assessment and group assessment.

LECTURER ASSESSMENT	The lecturer assesses students' performance against given criteria in different contexts, such as individual work, group work, etc.
SELF-ASSESSMENT	Students assess their own performance against given criteria in different contexts, such as individual work, group work, etc.
PEER ASSESSMENT	Students assess another student or group of students' performance against given criteria in different contexts, such as individual work, group work, etc.
GROUP ASSESSMENT	Students assess the individual performance of other students within a group or the overall performance of a group of students against given criteria.

9 INSTRUMENTS AND TOOLS FOR COLLECTING EVIDENCE

All evidence collected for assessment purposes is kept or recorded in the student's Portfolio of Evidence (PoE).

The following table summarises a variety of methods and instruments for collecting evidence. A method and instrument is chosen to give students ample opportunity to demonstrate the Subject Outcome has been attained. This will only be possible if the chosen methods and instruments are appropriate for the target group and the Specific Outcome being assessed.

	METHODS FOR COLLECTING EVIDENCE		
	Observation-based (Less structured)	Task-based (Structured)	Test-based (More structured)
Assessment instruments	<ul style="list-style-type: none"> • Observation, • Class questions, • Lecturer, student, parent discussions. 	<ul style="list-style-type: none"> • Assignments or tasks, • Projects, • Investigations or research, • Case studies, • Practical exercises, • Demonstrations, • Role-play, • Interviews. 	<ul style="list-style-type: none"> • Examinations, • Class tests, • Practical, examinations, • Oral tests, • Open-book tests.
Assessment tools	<ul style="list-style-type: none"> • Observation sheets, • Lecturer's notes, • Comments. 	<ul style="list-style-type: none"> • Checklists, • Rating scales, • Rubrics. 	<ul style="list-style-type: none"> • Marks (e.g. %), • Rating scales (1-7).
Evidence	<ul style="list-style-type: none"> • Focus on individual students, • Subjective evidence based on lecturer observations and impressions. 	<p>Open middle: Students produce the same evidence but in different ways.</p> <p>Open end: Students use same process to achieve different results.</p>	Students answer the same questions in the same way, within the same time.

10 TOOLS FOR ASSESSING STUDENT PERFORMANCE

Rating scales are marking systems where a symbol (such as 1 to 7) or a mark (such as 5/10 or 50%) is defined in detail. The detail is as important as the coded score. Traditional marking, assessment and evaluation mostly used rating scales without details such as what was right or wrong, weak or strong, etc.

Task lists and **checklists** show the student what needs to be done. They consist of short statements describing the expected performance in a particular task. The statements on the checklist can be ticked off when the student has adequately achieved the criterion. Checklists and task lists are useful in peer or group assessment activities.

Rubrics are a hierarchy (graded levels) of criteria with benchmarks that describe the minimum level of acceptable performance or achievement for each criterion. It is a different way of assessment and cannot be compared to tests. Each criterion described in the rubric must be assessed separately. Mainly, two types of rubrics, namely holistic and analytical, are used.

11 SELECTING AND/OR DESIGNING RECORDING AND REPORTING SYSTEMS

The selection or design of recording and reporting systems depends on the purpose of recording and reporting student achievement. **Why** particular information is recorded and **how** it is recorded determine which instrument will be used.

Computer-based systems, for example spreadsheets, are cost and time effective. The recording system should be user-friendly and information should be easily accessed and retrieved.

12 COMPETENCE DESCRIPTIONS

All assessment should award marks to evaluate specific assessment tasks. However, marks should be awarded against rubrics and not simply be a total of ticks for right answers. Rubrics should explain the competence level descriptors for the skills, knowledge, values and attitudes (SKVAs) a student must demonstrate to achieve each level of the rating scale.

When lecturers or assessors prepare an assessment task or question, they must ensure that the task or question addresses an aspect of a Subject Outcome. The relevant Assessment Standard must be used to create the rubric to assess the task or question. The descriptions must clearly indicate the minimum level of attainment for each category on the rating scale.

13 STRATEGIES FOR COLLECTING EVIDENCE

A number of different assessment instruments may be used to collect and record evidence. Examples of instruments that can be (adapted and) used in the classroom include:

13.1 Record sheets

The lecturer observes students working in a group. These observations are recorded in a summary table at the end of each project. The lecturer can design a record sheet to observe students' interactive and problem-solving skills, attitudes towards group work and involvement in a group activity.

13.2 Checklists

Checklists should have clear categories to ensure that the objectives are effectively met. The categories should describe how the activities are evaluated and against what criteria they are evaluated. Space for comments is essential.

ASSESSMENT IN FITTING AND TURNING LEVEL 2

SECTION C: ASSESSMENT IN FITTING AND TURNING LEVEL 2

1 ASSESSMENT SCHEDULE AND REQUIREMENTS

Internal and external assessments are conducted and the results of both are contributing to the final mark of a student in the subject

The internal continuous assessment (ICASS) mark accounts for 50 percent and the external examination mark for 50 percent of the final mark. A student needs a minimum final mark of 50 percent to enable a pass in the subject.

1.1 Internal assessment

Lecturers must compile a detailed assessment plan and assessment schedule of internal assessments to be undertaken during the year in the subject. (e.g. date, assessment task/or activity, rating code/marks allocated, assessor, moderator.)

All internal assessments are then conducted according to the plan and schedule using appropriate assessment instruments and tools for each assessment task (e.g. tests, assignments, practical tasks/projects and memorandum, rubric, checklist)

The marks allocated to both the minimum number of practical and written assessment tasks conducted during the internal continuous assessment (ICASS) are kept and recorded in the Portfolio of Evidence (PoE) which is subjected to internal and external moderation.

A year mark out of 100 is calculated from the ICASS marks contained in the PoE and submitted to the Department on the due date towards the end of the year.

The following internal assessment units currently **GUIDE** the internal assessment of Fitting and Turning Level 2.

TASKS	Time-frame	Type of assessment activity	Time and proposed mark allocation *(can be increased but not reduced)	Scope of assessment	% contribution to the year mark
				Do not confuse the weightings of topics in the Subject Guidelines with the % contribution to the year mark	
1	Term 1	Test	1 Hour (50 marks)	Topics completed in term 1	10
2	Term 1	Practical Assessment/ Assignment	Determined by the scope and nature of the task	One or more of the topics completed as an assignment	25
3	Term 2	Practical Assessment/ Assignment	Determined by the scope and nature of the task	One or more of the topics completed as an assignment	25
4	Term 2	Test*	1 Hour (50 marks)	Topics completed in term 1 and 2	10
5	Term 3	Internal Examination*	<i>As per external examinations</i> (P1 & P2 where applicable)	Topics completed to date (P1 =15 & P2=15, where applicable)	30
TOTAL					100

Specifications for internal assessment may change over time. A separate internal assessment guideline document '*Guidelines for the Implementation of Internal Continuous Assessment (ICASS) in the NC(V) qualifications at FET Colleges*' is developed, updated and distributed by the Department.. The conduct and administration of internal assessments must always comply with specifications contained in the most current version of the guideline document.

2 RECORDING AND REPORTING

Fitting and Turning is assessed according to five levels of competence. The level descriptions are explained in the following table.

Scale of Achievement for the Vocational component	RATING	MARKS %
5	Outstanding	80-100
4	Highly Competent	70-79
3	Competent	50-69
2	Not yet competent	40-49
1	Not achieved	0-39

The planned/scheduled assessment should be recorded in the Lecturer's Portfolio of Assessment (PoA) for each subject. The minimum requirements for the **Lecturer's Portfolio of Assessment** should be as follows:

- Lecturer information
- A contents page
- Subject and Assessment Guidelines
- A subject Year plan /Work scheme/Pace Setter
- A subject assessment plan
- Instrument(s) (tests, assignments, practical) and tools (memorandum, rubric, checklist) for each assessment task
- A completed pre-moderation checklist for each of the ICASS tasks and their accompanying assessment tools
- A completed post-moderation checklist once the task has been administered and assessed
- Subject record sheets per level/class reflecting the marks achieved by students in the ICASS tasks completed
- Evidence of review – diagnostic and statistical analysis, including notes on improvement of the task for future use

The college could standardise these documents.

The minimum requirements for the **student's Portfolio of Evidence (PoE)** should be as follows:

- Student information/identification
- Declaration of authenticity form – duly completed (signed and dated)
- A contents page/list of content (for accessibility)
- A subject assessment schedule
- The evidence of marked assessment tasks and feedback according to the assessment schedule

- A record/summary/ of results showing all the marks achieved per assessment for the subject
- Evidence of moderation (only where applicable for student's whose tasks were moderated)
- Where tasks cannot be contained as evidence in the Portfolio of Evidence (PoE), its exact location must be recorded and it must be readily available for moderation purposes.

3 INTERNAL ASSESSMENT OF SUBJECT OUTCOMES IN FITTING AND TURNING– LEVEL 2

Topic 1: Grinding and Sharpening

SUBJECT OUTCOME	
1.1 Explain correct safety procedures and care when grinding tools and drill bits	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • Worksite health and safety practices are explained. 	<ul style="list-style-type: none"> • Explain worksite health and safety practices.
<ul style="list-style-type: none"> • Good housekeeping is explained. 	<ul style="list-style-type: none"> • Explain good housekeeping.
<ul style="list-style-type: none"> • Safety precautions before and after using the grinding machine are explained 	<ul style="list-style-type: none"> • Explain the safety precautions before and after using the grinding machine.
<ul style="list-style-type: none"> • The importance of a clean working area is explained 	<ul style="list-style-type: none"> • Explain the importance of a clean working area.
<ul style="list-style-type: none"> • The necessity of cleaning equipment, materials and machines is recalled. 	<ul style="list-style-type: none"> • Describe the necessity of cleaning equipment, materials and machines.
<ul style="list-style-type: none"> • Appropriate safety clothes for grinding process are identified and the importance of it is explained. 	<ul style="list-style-type: none"> • Identify appropriate safety clothes for a grinding process and explain the importance of it.
<ul style="list-style-type: none"> • Flammable materials which might cause an unsafe working environment are identified and removed. 	<ul style="list-style-type: none"> • Identify and remove any flammable materials which might cause an unsafe working environment.

ASSESSMENT TASKS OR ACTIVITIES
<ul style="list-style-type: none"> • Observation • Assignments or tasks • Projects • Practical exercises • Demonstrations

SUBJECT OUTCOME	
1.2 Demonstrate an understanding of grinding processes associated with tools and drill bits.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • Different types of grinding wheels are identified and described. 	<ul style="list-style-type: none"> • Identify and describe different types of grinding wheels.
<ul style="list-style-type: none"> • The rotational speed of a drilling machine is determined using the calculation ($S = \pi \times D \times N$) 	<ul style="list-style-type: none"> • Determine the rotational speed of a drilling machine
<ul style="list-style-type: none"> • Angles (helix, rakes, clearance etc) of grinding 	<ul style="list-style-type: none"> • Identify the types of angles (helix, rakes,

tools and drill bits are identified and explained.	clearance etc) of grinding tools and drill bits.
<ul style="list-style-type: none"> The material is tested using typical tests in the workshop. 	<ul style="list-style-type: none"> Identify types of material using typical tests in the workshop.
<ul style="list-style-type: none"> The correct sequence of activities to follow during grinding cutting tools and drill bits is explained. 	<ul style="list-style-type: none"> Explain correct sequence of activities to follow during grinding cutting tools and drill bits
<ul style="list-style-type: none"> The implications of incorrect sequence of activities and operations are recalled. 	<ul style="list-style-type: none"> Describe the implications of incorrect sequence of activities and operations

ASSESSMENT TASKS OR ACTIVITIES

- Knowledge assessment
- Assignment/presentation
- Interview (oral) in order to evaluate ability to recall information

SUBJECT OUTCOME

1.3 Plan and prepare for tool grinding.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Different grades and shapes of grinding wheels are explained and the correct grinding wheel is selected. 	<ul style="list-style-type: none"> Demonstrate knowledge of different grades and shapes of grinding wheels.
<ul style="list-style-type: none"> The appropriate material to cut/drill is selected. 	<ul style="list-style-type: none"> Establish material to be cut/drill with the tool/drill bit.
<ul style="list-style-type: none"> The types of angles (helix, rakes, clearance etc) are identified. 	<ul style="list-style-type: none"> Identify the types of angles (helix, rakes, clearance etc).
<ul style="list-style-type: none"> The material a tool is made of is confirmed. 	<ul style="list-style-type: none"> Identify type of material a tool is made of.
<ul style="list-style-type: none"> Different types of grinding wheels and codes of classification are identified. 	<ul style="list-style-type: none"> Identify different types of grinding wheels and codes of classification.
<ul style="list-style-type: none"> The grinding wheel is inspected. 	<ul style="list-style-type: none"> Inspect the grinding wheels.
<ul style="list-style-type: none"> The grinding wheel is dressed and the tool rest is adjusted. 	<ul style="list-style-type: none"> Dress the grinding wheel and adjust the tool rest.
<ul style="list-style-type: none"> Damaged or sub-standard components and equipment are identified corrective action is taken. 	<ul style="list-style-type: none"> Identify damaged or sub-standard components and equipment and take appropriate corrective action

ASSESSMENT TASKS OR ACTIVITIES

- Knowledge assessment
- Assignment/presentation
- Interview (oral) in order to evaluate ability to recall information

SUBJECT OUTCOME

1.4. Grind tools and drill bits.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The drill bit and/or tool condition is evaluated by inspection. 	<ul style="list-style-type: none"> Inspect and assess drill bits and tool condition.
<ul style="list-style-type: none"> The drill bit/tool is sharpened according to manufacturer's specifications and job requirements. 	<ul style="list-style-type: none"> Sharpen the drill bit/tool to manufacturer's specifications and to meet job requirements.

<ul style="list-style-type: none"> The set up angles are completed using the correct measuring instrument. 	<ul style="list-style-type: none"> Determine and complete set up angles using the correct measuring instrument.
<ul style="list-style-type: none"> The drill bit is positioned on the rest. 	<ul style="list-style-type: none"> Position the drill bit on the rest
<ul style="list-style-type: none"> The drill bit is sharpened to meet the required angle for different materials. 	<ul style="list-style-type: none"> Sharpen the drill bit to meet the required angle for different materials.
<ul style="list-style-type: none"> The tool and/or drill bits are checked for compliance according to specifications and further grinding is applied where necessary 	<ul style="list-style-type: none"> Check tool and/drill bits for compliance with specifications and apply further grinding if necessary
<ul style="list-style-type: none"> Coolant is applied during grinding process to prevent overheating of grinding surface. 	<ul style="list-style-type: none"> Apply cooling during grinding process to prevent overheating of grinding surface.
<ul style="list-style-type: none"> Appropriate safety practices are applied during the grinding process. 	<ul style="list-style-type: none"> Apply appropriate safety practices during the grinding process.

ASSESSMENT TASKS OR ACTIVITIES

<ul style="list-style-type: none"> Observation Assignments or tasks Projects Practical exercises Demonstrations
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SUBJECT OUTCOME

1.5. Store equipment and record information on completed work.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Grinding tools and equipment are cleaned. 	<ul style="list-style-type: none"> Clean grinding tools and equipment.
<ul style="list-style-type: none"> Grinding tools and equipment are stored in a safe place. 	<ul style="list-style-type: none"> Store grinding tools and equipment in a safe place.
<ul style="list-style-type: none"> Information on completed job is recorded accurately and stored in a safe place. 	<ul style="list-style-type: none"> Accurately record information on completed job. Store information in a safe place.
<ul style="list-style-type: none"> Incidents and problems related to tool grinding are explained and reported. 	<ul style="list-style-type: none"> Explain incidents and report problems related to tool grinding.

ASSESSMENT TASKS OR ACTIVITIES

<ul style="list-style-type: none"> Observation Assignments or tasks Projects Practical exercises Demonstrations
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Topic 2: Drilling Machines

SUBJECT OUTCOME

2.1 Work safely with drilling machines

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Worksite health and safety practices are explained. 	<ul style="list-style-type: none"> Recall and apply worksite health and safety practices.
<ul style="list-style-type: none"> Good housekeeping is explained and 	<ul style="list-style-type: none"> Apply good housekeeping.

demonstrated.	
<ul style="list-style-type: none"> Work area is cleaned after the completion of the task. 	<ul style="list-style-type: none"> Clean work area after the completion of the task.
<ul style="list-style-type: none"> Equipment, materials and machines are cleaned after use. 	<ul style="list-style-type: none"> Clean equipment, materials and machines after use.

ASSESSMENT TASKS OR ACTIVITIES

- Observation
- Assignments or tasks
- Projects
- Practical exercises
- Demonstrations

SUBJECT OUTCOME

2.2 Demonstrate an understanding of drilling machines and drilling processes.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Different types of drilling machines are identified and their functions are explained. 	<ul style="list-style-type: none"> Identify and explain the functions of different types of drilling machines.
<ul style="list-style-type: none"> The rotational speed of a drilling machine is determined for the drilling of specific material-types and hole sizes. ($S = \pi \times D \times N$) 	<ul style="list-style-type: none"> Determine the rotational speed of a drilling machine for the drilling of specific material-types and hole sizes.
<ul style="list-style-type: none"> The range of different clamping methods associated with drilling machines and types of work-piece shapes are identified and explained. 	<ul style="list-style-type: none"> Identify and explain the range of different clamping methods associated with drilling machines.
<ul style="list-style-type: none"> The correct sequence of activities to follow during drilling is explained. 	<ul style="list-style-type: none"> Explain correct sequence of activities to follow during drilling.
<ul style="list-style-type: none"> The implications of applying the incorrect sequence of activities and operations are described. 	<ul style="list-style-type: none"> Describe the implications of incorrect sequence of activities and operations.

ASSESSMENT TASKS OR ACTIVITIES

- Knowledge assessment
- Assignment/presentation
- Interview (oral) in order to evaluate ability to recall information

SUBJECT OUTCOME

2.3 Prepare for work activity and set the drilling machine.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The correct tools and equipment for the job are selected. 	<ul style="list-style-type: none"> Select correct tools and equipment for the job.
<ul style="list-style-type: none"> Materials for the job are selected and revolutions per minute are calculated (RPM). 	<ul style="list-style-type: none"> Choose materials for the job and calculate revolutions per minute (RPM).
<ul style="list-style-type: none"> The time taken for the job is determined. 	<ul style="list-style-type: none"> Indicate time to be taken for the job.
<ul style="list-style-type: none"> The selected tooling is fitted to the drill spindle. 	<ul style="list-style-type: none"> Fit selected tooling to drill spindle.
<ul style="list-style-type: none"> The drilling machine is adjusted according to the required speed. 	<ul style="list-style-type: none"> Calculate required speed and adjust machine speed

<ul style="list-style-type: none"> The work-piece is clamped in position relative to drill centre line axis 	<ul style="list-style-type: none"> Clamp work piece in position relative to drill centre line axis
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ASSESSMENT TASKS OR ACTIVITIES

- Knowledge assessment
- Assignment/presentation
- Interview (oral) in order to evaluate ability to recall information

SUBJECT OUTCOME

2.4. Perform drilling operations.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The drilling machine is switched on. 	<ul style="list-style-type: none"> Start drilling machine.
<ul style="list-style-type: none"> The drilling process and machine is monitored for safety and effectiveness of the drilling operation. 	<ul style="list-style-type: none"> Monitor drilling machine.
<ul style="list-style-type: none"> Speeds and feeds are monitored and adjustments are made for drilling/cutting efficiency. 	<ul style="list-style-type: none"> Adjust speeds and feeds.

ASSESSMENT TASKS OR ACTIVITIES

- Observation
- Assignments or tasks
- Projects
- Practical exercises
- Demonstrations

SUBJECT OUTCOME

2.5. Apply quality checks and record information on completed work

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The correct measuring tools, gauges and equipment for quality checking the component, are selected and applied. 	<ul style="list-style-type: none"> Select and apply correct measuring tools, gauges and equipment for quality checking the component.
<ul style="list-style-type: none"> Critical points for checking are identified. 	<ul style="list-style-type: none"> Identify critical points for checking
<ul style="list-style-type: none"> Malfunctions are identified and reported or repaired spontaneously. 	<ul style="list-style-type: none"> Recognise and report malfunctions.
<ul style="list-style-type: none"> A file is created and saved in order to record the information on work done. (<i>file/report is kept for reference purposes</i>) 	<ul style="list-style-type: none"> Select a name for the file and record the information on work done in the file.
<ul style="list-style-type: none"> The file is saved for reference purposes. 	<ul style="list-style-type: none"> Save the file for reference purposes.

ASSESSMENT TASKS OR ACTIVITIES

- Observation
- Assignments or tasks
- Projects
- Practical exercises

<ul style="list-style-type: none"> • Demonstrations
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Topic 3: Hand Threading and Reaming

SUBJECT OUTCOME	
3.1 Work safely during hand threading and reaming work.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • Worksite health, safety and environmental protective practices are explained and applied. 	<ul style="list-style-type: none"> • Explain and apply worksite health, safety and environmental protective practices.
<ul style="list-style-type: none"> • Good housekeeping is applied. • Best practice safety measures for threading and reaming are recalled 	<ul style="list-style-type: none"> • Apply good housekeeping. • Recall best practice safety measures for threading and reaming.
<ul style="list-style-type: none"> • An awareness of the need to keep equipment, materials and machines clean after use, demonstrated. 	<ul style="list-style-type: none"> • Demonstrate awareness of the need to keep equipment, materials and machines clean after use.
<ul style="list-style-type: none"> • Personal protective equipment is worn during threading and reaming procedures 	<ul style="list-style-type: none"> • Wear personal protective equipment during threading and reaming procedures.

ASSESSMENT TASKS OR ACTIVITIES
<ul style="list-style-type: none"> • Observation • Assignments or tasks • Projects • Practical exercises • Demonstrations

SUBJECT OUTCOME	
3.2 Demonstrate an understanding of screw-threads.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • Knowledge of thread terms is demonstrated. 	<ul style="list-style-type: none"> • Demonstrate knowledge of thread terms
<ul style="list-style-type: none"> • The various types of thread and their applications are recalled. 	<ul style="list-style-type: none"> • Recall the various types of thread and their applications
<ul style="list-style-type: none"> • The different conditions by which certain types are used, are explained 	<ul style="list-style-type: none"> • Explain the different conditions by which certain types are used.

ASSESSMENT TASKS OR ACTIVITIES
<ul style="list-style-type: none"> • Knowledge assessment • Assignment/presentation • Interview (oral) in order to evaluate ability to recall information

SUBJECT OUTCOME	
3.3. Demonstrate an understanding of hand taps, stocks and dies and reamers.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES

<ul style="list-style-type: none"> Knowledge of the terminology associated with hand taps, stocks and dies and reamers is demonstrated. 	<ul style="list-style-type: none"> Demonstrate knowledge of the terminology associated with hand taps, stocks and dies and reamers
<ul style="list-style-type: none"> The various types of hand taps, stocks and dies and reamers are explained. 	<ul style="list-style-type: none"> Recall the various types of hand taps, stocks and dies and reamers.
<ul style="list-style-type: none"> The different conditions by which certain types of hand taps, stocks and dies and reamers are used – are explained. 	<ul style="list-style-type: none"> Explain the different conditions by which certain types of hand taps, stocks and dies and reamers are used.
<ul style="list-style-type: none"> Common faults associated with the use of hand tap, stocks and dies and reamers are explained. 	<ul style="list-style-type: none"> Recall common faults associated with the use of hand tap, stocks and dies and reamers
<ul style="list-style-type: none"> The function and application of various cutting fluids is explained. 	<ul style="list-style-type: none"> Explain the function and application of various cutting fluids

ASSESSMENT TASKS OR ACTIVITIES

<ul style="list-style-type: none"> Knowledge assessment Assignment/presentation Interview (oral) in order to evaluate ability to recall information
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SUBJECT OUTCOME

3.4. Plan and prepare materials and equipment for threading and reaming.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The drawing and work instruction for the job is interpreted 	<ul style="list-style-type: none"> Interpret the drawing and work instruction for the job
<ul style="list-style-type: none"> The material is selected and marked off for the job. 	<ul style="list-style-type: none"> Select and mark off the material for the job.
<ul style="list-style-type: none"> The correct drill size (where applicable) for the job is identified and selected. 	<ul style="list-style-type: none"> Identify the correct drill size (where applicable) for the job
<ul style="list-style-type: none"> The correct taps, stocks and dies and reamers are selected. 	<ul style="list-style-type: none"> Select the correct taps, stocks and dies and reamers.
<ul style="list-style-type: none"> The correct cutting fluid is selected according to the material-type. 	<ul style="list-style-type: none"> Prepare the correct cutting fluid
<ul style="list-style-type: none"> The drilling machine is adjusted to the appropriate speed (RPM) requirements. 	<ul style="list-style-type: none"> Adjust the drilling machine to the appropriate speed (RPM) requirements.
<ul style="list-style-type: none"> The correct and safe clamping or fixing of the work piece is illustrated. 	<ul style="list-style-type: none"> Apply the correct and safe clamping or fixing method for the work piece

ASSESSMENT TASKS OR ACTIVITIES

<ul style="list-style-type: none"> Observation Assignments or tasks Projects Practical exercises Demonstrations
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SUBJECT OUTCOME

3.5. Produce threads and ream a work-piece.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The marking position is inspected 	<ul style="list-style-type: none"> Inspect the marking position.

<ul style="list-style-type: none"> The work-piece is drilled and/or the outside diameter is prepared for threading by chamfering the work-piece 	<ul style="list-style-type: none"> Drill the work-piece and/or prepare the outside diameter for threading by chamfering the work-piece
<ul style="list-style-type: none"> The correct method of threading and reaming is applied and the equipment is used correctly 	<ul style="list-style-type: none"> Apply the correct method of threading and reaming and use the equipment correctly
<ul style="list-style-type: none"> The correct cutting fluid or lubricant is applied for the job 	<ul style="list-style-type: none"> Apply the correct cutting fluid or lubricant for the job
<ul style="list-style-type: none"> Finishing techniques are conducted by cleaning and de-burring the work-piece 	<ul style="list-style-type: none"> Conduct finishing techniques by cleaning and de-burring the work-piece

ASSESSMENT TASKS OR ACTIVITIES

- Observation
- Assignments or tasks
- Projects
- Practical exercises
- Demonstrations

SUBJECT OUTCOME

3.6. Apply quality checks and store equipment.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Gauge equipment and tools for quality checking are selected and used 	<ul style="list-style-type: none"> Select and use gauge equipment and tools for quality checking.
<ul style="list-style-type: none"> The required checking is completed. 	<ul style="list-style-type: none"> Identify critical points to be checked.
<ul style="list-style-type: none"> A report is written 	<ul style="list-style-type: none"> Write a report.
<ul style="list-style-type: none"> Threading and reaming equipment are cleaned 	<ul style="list-style-type: none"> Clean threading and reaming equipment.
<ul style="list-style-type: none"> Equipment is stored in a safe place. 	<ul style="list-style-type: none"> Store equipment in a safe place.
<ul style="list-style-type: none"> Equipment is placed in a toolbox and/or returned to the store-room 	<ul style="list-style-type: none"> Place equipment in a toolbox and/or return to store-room
<ul style="list-style-type: none"> Lubricating oil is used sparingly to preserve equipment. 	<ul style="list-style-type: none"> Apply lubricating oil sparingly to equipment for preservation

ASSESSMENT TASKS OR ACTIVITIES

- Observation
- Assignments or tasks
- Projects
- Practical exercises
- Demonstrations

Topic 4: Keys and Fasteners

SUBJECT OUTCOME

4.1. Work safely with keys and fasteners.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Worksite health, safety and environmental protective practices is explained and applied in terms of safety regulations 	<ul style="list-style-type: none"> Explain and apply worksite health, safety and environmental protective practices.
<ul style="list-style-type: none"> Good housekeeping is applied according to 	<ul style="list-style-type: none"> Apply good housekeeping.

industry best practice.	
<ul style="list-style-type: none"> Best practice safety measures for the application of keys and fasteners are explained. 	<ul style="list-style-type: none"> Recall best practice safety measures for the application of keys and fasteners.
<ul style="list-style-type: none"> Awareness of the need to keep equipment, materials and machines clean after use – is demonstrated 	<ul style="list-style-type: none"> Demonstrate awareness of the need to keep equipment, materials and machines clean after use.
<ul style="list-style-type: none"> Personal protective equipment is worn during the use of keys and fasteners. 	<ul style="list-style-type: none"> Wear personal protective equipment during the use of keys and fasteners.

ASSESSMENT TASKS OR ACTIVITIES

- Knowledge assessment
- Assignment/presentation
- Interview (oral) in order to evaluate ability to recall information
- Observation
- Assignments or tasks
- Projects
- Practical exercises
- Demonstrations

SUBJECT OUTCOME

4.2. Demonstrate and understanding and application of keys and key-ways.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Knowledge of terms associated with keys and key-ways is demonstrated 	<ul style="list-style-type: none"> Demonstrate knowledge of terms associated with keys and key-ways
<ul style="list-style-type: none"> The various types of keys and their applications are described 	<ul style="list-style-type: none"> Recall the various types of keys and their applications
<ul style="list-style-type: none"> The different conditions by which certain types of keys are used are described. 	<ul style="list-style-type: none"> Explain the different conditions by which certain types of keys are used.
<ul style="list-style-type: none"> The main specifications (sizes) of a key or key-way are determined in terms of thickness and height 	<ul style="list-style-type: none"> Determine the main specifications (sizes) of a key or key-way
<ul style="list-style-type: none"> The common processes by which key-ways are produced are recalled according to method or machinery. 	<ul style="list-style-type: none"> Recall the common processes by which key-ways are produced.
<ul style="list-style-type: none"> Keys and key-ways are used according to their design requirements. 	<ul style="list-style-type: none"> Use keys and key-ways according to design requirements.

ASSESSMENT TASKS OR ACTIVITIES

- Knowledge assessment
- Assignment/presentation
- Interview (oral) in order to evaluate ability to recall information
- Observation
- Assignments or tasks
- Projects
- Practical exercises
- Demonstrations

SUBJECT OUTCOME

4.3. Demonstrate an understanding and application of fasteners.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Knowledge of the terminology associated with fasteners is demonstrated 	<ul style="list-style-type: none"> Demonstrate knowledge of the terminology associated with fasteners
<ul style="list-style-type: none"> The various types of fasteners are identified and described in terms of typical industry application. 	<ul style="list-style-type: none"> Recall the various types of fasteners.
<ul style="list-style-type: none"> The different conditions by which certain types of fasteners are used are explained. 	<ul style="list-style-type: none"> Explain the different conditions by which certain types of fasteners are used.
<ul style="list-style-type: none"> Auxiliary fasteners and their applications are explained. 	<ul style="list-style-type: none"> Demonstrate knowledge of auxiliary fasteners and their applications
<ul style="list-style-type: none"> Common faults associated with the use of fasteners are explained 	<ul style="list-style-type: none"> Recall common faults associated with the use of fasteners.
<ul style="list-style-type: none"> Fasteners are used in terms of intended design and manufacturer's specification. 	<ul style="list-style-type: none"> Use fasteners

ASSESSMENT TASKS OR ACTIVITIES

- Observation
- Assignments or tasks
- Projects
- Practical exercises
- Demonstrations

Topic 5: Centre Lathe**SUBJECT OUTCOME****5.1. Follow safety rules and maintain safety precautions**

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Appropriate clothing is used and worn 	<ul style="list-style-type: none"> Wear and use appropriate clothing
<ul style="list-style-type: none"> The machine guards are in place 	<ul style="list-style-type: none"> Check that the machine guards are in place
<ul style="list-style-type: none"> The work area is free and spacious 	<ul style="list-style-type: none"> Check that the work area is free and spacious
<ul style="list-style-type: none"> The lathe machine is off when loading and unloading a work piece 	<ul style="list-style-type: none"> Ensure the lathe machine is off when loading and unloading a work piece.
<ul style="list-style-type: none"> A guard or shield is used to deflect chips 	<ul style="list-style-type: none"> Use a guard or shield to deflect chips
<ul style="list-style-type: none"> The work area is cleaned. 	<ul style="list-style-type: none"> Clean the work area

ASSESSMENT TASKS OR ACTIVITIES**SUBJECT OUTCOME****5.2. Prepare Operation Sheet**

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The correct type of HSS cutting tool is selected 	<ul style="list-style-type: none"> Identify the type of HSS cutting tool to be used.
<ul style="list-style-type: none"> The work-piece material is identified 	<ul style="list-style-type: none"> Identify the work-piece material

<ul style="list-style-type: none"> The work-piece diameter is determined 	<ul style="list-style-type: none"> Determine the work-piece diameter
<ul style="list-style-type: none"> The cutting speed is identified as per the specifications 	<ul style="list-style-type: none"> Identify the cutting speed as per the specifications
<ul style="list-style-type: none"> The depth of cut of roughing/finishing is calculated 	<ul style="list-style-type: none"> Calculate the RPM according to roughing/finishing
<ul style="list-style-type: none"> The depth of cut is calculated according to roughing/finishing 	<ul style="list-style-type: none"> Calculate the depth of cut according to roughing/finishing
<ul style="list-style-type: none"> The feed rate cut is calculated according to roughing/finishing 	<ul style="list-style-type: none"> Calculate the feed rate cut according to roughing/finishing
<ul style="list-style-type: none"> The proper machining sequence is identified 	<ul style="list-style-type: none"> Identify the proper machining sequence
<ul style="list-style-type: none"> An appropriate tolerance is specified as per the drawing (e.g. ± 0.2) 	<ul style="list-style-type: none"> Specify an appropriate tolerance as per the drawing (e.g. ± 0.2)
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Complete the operation sheet. 	

SUBJECT OUTCOME	
5.3. Prepare for work activity	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Tools and equipment required for the lathe operation are selected. 	<ul style="list-style-type: none"> Select tools and equipment required for lathe operation.
<ul style="list-style-type: none"> Checks are completed to ensure tools and equipment are in a good working condition 	<ul style="list-style-type: none"> Check tools and equipment are in good working condition
<ul style="list-style-type: none"> The lathe is maintained, oiled and lubricated according to specifications 	<ul style="list-style-type: none"> Ensure the lathe is maintained, oiled and lubricated.
<ul style="list-style-type: none"> Knowledge is demonstrated on the use of handles, gearbox and spindle settings 	<ul style="list-style-type: none"> Demonstrate knowledge of the handles, gearbox and spindles settings
<ul style="list-style-type: none"> Checks are completed to ensure the coolant is available, tested and correctly running 	<ul style="list-style-type: none"> Check that coolant is available, tested and running correctly
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> The lathe is maintained and lubricated The use of the settings and handles are demonstrated and used correctly 	

SUBJECT OUTCOME	
5.4. Set the centre lathe.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The selected cutting tool is fitted in the tool post and the cutter height adjusted. 	<ul style="list-style-type: none"> Fit selected cutter in tool post and adjust cutter height.
<ul style="list-style-type: none"> The graduated sleeve of the cross-slide is set to zero. 	<ul style="list-style-type: none"> Set the graduated sleeve of the cross-slide to zero.
<ul style="list-style-type: none"> The compound slide is set to zero. 	<ul style="list-style-type: none"> Set the compound slide graduated dial to zero.
<ul style="list-style-type: none"> The carriage is positioned for cutting. 	<ul style="list-style-type: none"> Position carriage for cut.
<ul style="list-style-type: none"> The work piece is mounted in a three or four-jaw chuck. 	<ul style="list-style-type: none"> Mount the work piece in a three or four-jaw chuck.
<ul style="list-style-type: none"> Ensure that the set-up is checked and securely 	<ul style="list-style-type: none"> Clamp securely and check the set-up.

clamped.
ASSESSMENT TASKS OR ACTIVITIES
<ul style="list-style-type: none"> The selection of required accessories, cutting tool and work holding fixtures is correct. The mounting of selected tools is correct.

SUBJECT OUTCOME	
5.5. Perform turning operations	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The lathe is monitored while in operation 	<ul style="list-style-type: none"> Monitor lathe during operation
<ul style="list-style-type: none"> Speeds and feed rate are adjusted if required. 	<ul style="list-style-type: none"> Adjusting speeds and feeds where required.
<ul style="list-style-type: none"> The cutter is set against the work piece and the cutting depth is adjusted according to the operation sheet. 	<ul style="list-style-type: none"> Set cutter against work piece and adjust cutting depth
<ul style="list-style-type: none"> The feed rate is automatically or manually engaged. 	<ul style="list-style-type: none"> Engage automatic or manual feed.
<ul style="list-style-type: none"> Facing, longitude turning, grooving and knurling is performed 	<ul style="list-style-type: none"> Perform facing, longitudinal turning, grooving and knurling
<ul style="list-style-type: none"> The work piece is monitored and measured during operation 	<ul style="list-style-type: none"> Monitor and measure the work piece during operation
<ul style="list-style-type: none"> Specified tolerances are maintained 	<ul style="list-style-type: none"> Maintain specified tolerances
<ul style="list-style-type: none"> The lathe is cleaned after operation 	<ul style="list-style-type: none"> Clean the lathe after operation
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Machined component is removed on completion of the turning process. Lathe operation is monitored to specifications. Lathe machine speed and feed is adjusted. 	

SUBJECT OUTCOME	
5.6 Apply quality checks on machined component.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Correct tools and equipment for quality checking are selected. 	<ul style="list-style-type: none"> Select correct tools and equipment for quality checking.
<ul style="list-style-type: none"> Values for checking are identified according to specifications 	<ul style="list-style-type: none"> Identify values for checking and carry out measurements
<ul style="list-style-type: none"> Cutting surface finish is checked for compliance to specifications 	<ul style="list-style-type: none"> Check finish of the cut surface.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Selection and preparation of measuring equipment is precise. Component is measured with correct measuring tools according to specifications. 	

SUBJECT OUTCOME	
5.7 Recognise and report problems, changes and/or malfunctions while operating	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Conformance of component to specifications is documented. 	<ul style="list-style-type: none"> Recognise and report problems. Recognise and report changes. Recognise and report malfunctions.

ASSESSMENT TASKS OR ACTIVITIES

Information is recorded accurately in assessment sheet

Topic 6: Milling Machine**SUBJECT OUTCOME****6.1. Follow safety rules and maintain safety precautions**

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Appropriate clothing is worn. 	<ul style="list-style-type: none"> Ensure the clothing is appropriate
<ul style="list-style-type: none"> The machine guards are in place 	<ul style="list-style-type: none"> Ensure the machine guards are in place
<ul style="list-style-type: none"> Actions are taken to ensure the work area is free and spacious 	<ul style="list-style-type: none"> Ensure the work area is free and spacious
<ul style="list-style-type: none"> Checks are completed to ensure the milling machine is off when loading and unloading a work piece, when taking measurements and during cleaning 	<ul style="list-style-type: none"> Ensure the milling machine is off when loading and unloading a work piece, when taking measurements and during cleaning
<ul style="list-style-type: none"> Gloves / hand protection is used when mounting the milling cutters. 	<ul style="list-style-type: none"> When mounting milling cutters use gloves /hand protection
<ul style="list-style-type: none"> A guard or shield is used to deflect chips 	<ul style="list-style-type: none"> Use a guard or shield to deflect chips
<ul style="list-style-type: none"> The work area is cleaned and free of chips, spills and fluids. 	<ul style="list-style-type: none"> Ensure the work area is clean and free of chips, spills and fluids
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Works in an area which is clean and free of spills and fluids Use of guards, shields, wear goggles and appropriate clothing Switch the machine off when loading and unloading work piece and taking measurements 	

SUBJECT OUTCOME**6.2. Prepare Operation Sheet**

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The type of HSS cutting tool to be used is identified 	<ul style="list-style-type: none"> Identify the type of HSS cutting tool to be used.
<ul style="list-style-type: none"> The cutting speed is identified as per the specifications 	<ul style="list-style-type: none"> Identify the cutting speed as per the specifications
<ul style="list-style-type: none"> The RPM is calculated according to roughing/finishing 	<ul style="list-style-type: none"> Calculate the RPM according to roughing/finishing
<ul style="list-style-type: none"> The depth of cut is calculated according to roughing/finishing 	<ul style="list-style-type: none"> Calculate the depth of cut according to roughing/finishing
<ul style="list-style-type: none"> The feed rate cut is calculated according to roughing/finishing 	<ul style="list-style-type: none"> Calculate the feed rate cut according to roughing/finishing
<ul style="list-style-type: none"> The proper turning sequence is identified 	<ul style="list-style-type: none"> Identify the proper machining sequence
<ul style="list-style-type: none"> The working tolerances are specified as per drawing ± 0.2 	<ul style="list-style-type: none"> Specify an appropriate tolerance as per the drawing ± 0.2
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> The operation sheet is complete 	

SUBJECT OUTCOME**6.3. Prepare for work activity**

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The machine is prepared for operation including lubrication, routine maintenance and pre-operational checks 	<ul style="list-style-type: none"> Prepare the machine for operation including lubrication, routine maintenance and pre-operational checks.
<ul style="list-style-type: none"> The materials and tools are available and appropriate 	<ul style="list-style-type: none"> Ensure that the material and tools required are available and appropriate
<ul style="list-style-type: none"> Availability of cutting fluid is ensured 	<ul style="list-style-type: none"> Ensure that the cutting fluid is available
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> The preparation of the machine for operation is complete. The checking of materials and tools required at workstation is correctly done 	

SUBJECT OUTCOME	
6.4. Set the milling machine	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The appropriate cutting tool is mounted 	<ul style="list-style-type: none"> Mount the appropriate cutting tool
<ul style="list-style-type: none"> The clamping arrangement is set 	<ul style="list-style-type: none"> Select and mount machine vice
<ul style="list-style-type: none"> Checks are done to ensure the table X and Y axes are perpendicular to the spindle axis. 	<ul style="list-style-type: none"> Check that the table X and Y axes are perpendicular to spindle axis.
<ul style="list-style-type: none"> Checks are done to ensure the fixed jaw of the vice is parallel to the X axis 	<ul style="list-style-type: none"> Ensure that the fixed jaw of the vice is parallel to the X axis
<ul style="list-style-type: none"> The work piece is mounted and positioned correctly 	<ul style="list-style-type: none"> Mount and position the work piece correctly
<ul style="list-style-type: none"> Cutting speeds and feeds are selected and set according to the operation sheet 	<ul style="list-style-type: none"> Select and set cutting speeds and feeds according to the operation sheet
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> The selection of required accessories and work holding devices is correct. The mounting of required tool is correct. The selection and setting of cutting speeds and feeds is according to operation sheet. The work piece is mounted correctly 	

SUBJECT OUTCOME	
6.5. Perform milling operations	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The cutter is positioned and cutting depth and width is set 	<ul style="list-style-type: none"> Position cutter and set cutting depth and width.
<ul style="list-style-type: none"> The graduated dials are set to zero. 	<ul style="list-style-type: none"> Set graduated dials to zero.
<ul style="list-style-type: none"> The milling machine is monitored while in operation 	<ul style="list-style-type: none"> Monitor milling machine while in operation
<ul style="list-style-type: none"> The work piece is monitored and measured to ensure it is machined according to the drawing specifications. 	<ul style="list-style-type: none"> Monitor and measure the work piece during operation
<ul style="list-style-type: none"> The depth of cut, speeds and feeds are adjusted. 	<ul style="list-style-type: none"> Adjust the depth of cut, speeds and feeds
<ul style="list-style-type: none"> The cutter is flooded with coolant 	<ul style="list-style-type: none"> Lubricate the cutter with coolant
<ul style="list-style-type: none"> Automatic or manual feed is used 	<ul style="list-style-type: none"> Use automatic or manual feed.
<ul style="list-style-type: none"> An end-mill cutter is used to flat and slot milling within a tolerance of ± 0.2 performed 	<ul style="list-style-type: none"> Flat and slot milling within a tolerance of ± 0.2 (with the use of an end-mill cutter).
<ul style="list-style-type: none"> On completion of the job the milling machine is cleaned 	<ul style="list-style-type: none"> Cleaned the milling machine after the operation

ASSESSMENT TASKS OR ACTIVITIES
<ul style="list-style-type: none"> • The milling machine is monitored while in operation • The feed and speeds are adjusted and used during the turning • The removal of machined component on completion of milling processes is correct.

SUBJECT OUTCOME	
6.6 Apply quality checks on machined component.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • Correct tools and equipment for quality checking are selected. 	<ul style="list-style-type: none"> • Select correct tools and equipment for quality checking.
<ul style="list-style-type: none"> • Values for checking are identified. 	<ul style="list-style-type: none"> • Identify values for checking.
<ul style="list-style-type: none"> • Cutting surface finish is checked. 	<ul style="list-style-type: none"> • Check cutting surface finish.
<ul style="list-style-type: none"> • A quality check is performed on the work piece to ensure it conforms to the specifications on the assessment sheet and drawing 	<ul style="list-style-type: none"> • Perform a quality check on the work piece to ensure that the machined component conforms to the specifications on the assessment sheet and drawing
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> • Selection and preparation of measuring equipment is precise. • Component is measured according to specifications and the assessment sheet. 	

SUBJECT OUTCOME	
6.7 Recognise and report problems, changes and/or malfunctions while operating	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • Conformance of component to specifications is documented. 	<ul style="list-style-type: none"> • Recognise and report problems. • Recognise and report changes. • Recognise and report malfunctions.
ASSESSMENT TASKS OR ACTIVITIES	
Information is recorded accurately.	

4 SPECIFICATIONS FOR EXTERNAL ASSESSMENT IN FITTING AND TURNING– LEVEL 2

4.1 Integrated summative assessment task (ISAT)

A compulsory component of the external assessment (ESASS) is the **integrated summative assessment task (ISAT)**. The integrated summative assessment task (ISAT) draws on the students' cumulative learning achieved throughout the year. The task requires **integrated application of competence** and is executed and recorded in compliance with assessment conditions.

Two approaches to the integrated summative assessment task (ISAT) may be as follows:

The students are assigned a task at the beginning of the year which they will have to complete in phases throughout the year to obtain an assessment mark. A final assessment is made at the end of the year when the task is completed.

OR

Students achieve the competencies throughout the year but the competencies are assessed cumulatively in a single assessment or examination session at the end of the year.

The integrated summative assessment task (ISAT) is set by an externally appointed examiner and is conveyed to colleges in the first quarter of the year.

The integrated assessment approach enables students to be assessed in more than one subject with the same integrated summative assessment task (ISAT).

4.2 National Examination

A National Examination is conducted annually in October or November by means of a paper(s) set and moderated externally. The following distribution of cognitive application should be followed:

LEVEL 2	KNOWLEDGE	COMPREHENSION & APPLICATION	SYNTHESIS AND ANALYSIS
	50%	30%	20%