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NATIONAL CERTIFICATES (VOCATIONAL)

ASSESSMENT GUIDELINES

FITTING AND TURNING

NQF Level 4

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FITTING AND TURNING – LEVEL 4

CONTENTS

SECTION A: PURPOSE OF THE SUBJECT ASSESSMENT GUIDELINES

This document provides the lecturer with guidelines to develop and implement a coherent, integrated assessment system for Fitting and Turning 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: Fitting and Turning* to prepare for and deliver Fitting and Turning. 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 development capacity of the nation.

- ***Relevance***

To be dynamic and responsive to national development needs.

- ***Credibility***

To demonstrate national and international value and recognition of qualification and acquired competencies and skills.

- ***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 setting standards and co-ordinating the achievement of the qualification.

- ***Access***

To address barriers to learning at each level to facilitate students' progress.

- ***Progression***

To ensure that 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***

To enable students to transfer credits of qualifications from one learning institution and/or employer to another institution or employer.

- ***Articulation***

To allow for vertical and horizontal mobility in the education system when accredited pre-requisites have been successfully completed.

- ***Recognition of Prior Learning***

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

- ***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.

- ***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.

- ***Fairness and transparency***

To verify that no assessment process or method(s) hinders or unfairly advantages 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

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

To integrate assessment practices within an outcomes-based education and training system and 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-play and case studies. The internal continuous assessment (ICASS) practical component is undertaken in a real workplace, a workshop or a "Structured Environment". This component is moderated internally and externally quality assured by Umalusi. All internal continuous assessment (ICASS) evidence is kept in a PoE and must be readily available for monitoring, moderation and verification purposes.

2.2 External summative assessment (ESASS)

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

A compulsory component of external summative assessment (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 integrated summative assessment task (ISAT) is the most significant test of students' ability to apply acquired knowledge.

The integrated assessment approach allows students to be assessed in more than one subject with the same integrated summative assessment task (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 Education, 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 assuror; and
- moderates in case of a dispute between an assessor and a student.

Policy on inclusive education requires that assessment procedures be customised for students who experience barriers to learning, 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 internal continuous assessment (ICASS) must be re-submitted with each examination enrolment for which it constitutes a component.

5 ASSESSOR REQUIREMENTS

Assessors must be subject specialists and should ideally be declared competent against the standards set by the ETDP SETA. If the lecturer conducting the assessments has not been declared a competent assessor, an assessor who has been declared competent may be appointed to oversee the assessment process to ensure the quality and integrity of assessments.

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's 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 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	• Observation • Class questions • Lecturer, student, parent discussions	• Assignments or tasks • Projects • Investigations or research • Case studies • Practical exercises • Demonstrations • Role-play • Interviews	• Examinations • Class tests • Practical examinations • Oral tests • Open-book tests
Assessment tools	• Observation sheets • Lecturer's notes • Comments	• Checklists • Rating scales • Rubrics	• Marks (e.g. %) • Rating scales (1-7)
Evidence	• Focus on individual students • Subjective evidence based on lecturer observations and impressions	**Open middle**: Students produce the same evidence but in different ways. **Open end**: Students use same process to achieve different results.	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. These 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. Using rubrics is a different way of assessing 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 be simply a total of ticks for right answers. Rubrics should explain the competence level descriptors for the skills, knowledge, values and attitudes (SKVAs) that 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.

SECTION C: ASSESSMENT IN FITTING AND TURNING

1 SCHEDULE OF ASSESSMENT

At NQF levels 2, 3 and 4, lecturers will conduct assessments as well as develop a schedule of formal assessments that will be undertaken in the year. All three levels also have an external examination that accounts for 50 percent of the total mark. The marks allocated to assessment tasks completed during the year, kept or recorded in a PoE account for the other 50 percent.

The PoE and the external assessment include practical and written components. The practical assessment in Fitting and Turning must, where necessary, be subjected to external moderation by Umalusi or an appropriate Education and Training Quality Assurance (ETQA) body, appointed by the Umalusi Council in terms of Section 28(2) of the *General and Further Education and Training Quality Assurance Act, 2001 (Act No. 58 of 2001).*

2 RECORDING AND REPORTING

Fitting and Turning, as is the case for all the other Vocational subjects, 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 CODE	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 programme of assessment should be recorded in the Lecturer's Portfolio of Assessment for each subject. The following at least should be included in the Lecturer's Assessment Portfolio:

- A contents page
- The formal schedule of assessment
- The requirements for each assessment task
- The tools used for each assessment task
- Recording instrument(s) for each assessment task
- A mark sheet and report for each assessment task

The college must standardise these documents.

The student's PoE must include at least:

- A contents page
- The assessment tasks according to the assessment schedule
- The assessment tools or instruments for the task
- A record of the marks (and comments) achieved for each task

Where a task 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.

The following units guide internal assessment in Fitting and Turning Level 4:

NUMBER OF UNITS	ASSESSMENT	COVERAGE
4	Formal written tests	2 or 3 more completed topics
1	Internal written exam	All completed topics
4	Practical assessments	Must cover the related subject outcomes.

ASSESSMENT OF FITTING AND TURNING

LEVEL 4

3 INTERNAL ASSESSMENT OF SUBJECT OUTCOMES IN FITTING AND TURNING - LEVEL 4

Topic 1: Diagnose and repair faults on equipment and machinery during production/operation

SUBJECT OUTCOME	
1.1 Monitor the performance of equipment and machinery during operation.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Recurrent equipment is identified.	• Identify recurrent equipment.
• Machinery faults are identified.	• Identify machinery faults.
• Machinery and equipment root causes are identified.	• Identify machinery and equipment root causes.
ASSESSMENT TASKS OR ACTIVITIES	
Recurrent equipment, machinery faults and equipment root causes are well identified	

SUBJECT OUTCOME	
1.2 Perform minor repairs on line.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Minor repairs and maintenance are done accurately and timeously to avoid production problems and delays.	• Do minor repairs accurately. • Do maintenance accurately. • Do minor repairs and maintenance timeously to avoid production problems and delays.
ASSESSMENT TASKS OR ACTIVITIES	
Minor repairs and maintenance are done timeously to avoid production problems and delays.	

SUBJECT OUTCOME	
1.3 Determine major equipment and machinery component repairs.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Equipment and machinery components identified for major repair removed with minimal disruption to production process.	• Identify equipment components for major repair. • Identify machinery components for major repair. • Remove machinery and equipment components for major repair with minimal disruption to production process.
ASSESSMENT TASKS OR ACTIVITIES	
• Equipment components and machinery are identified for major repair. • Machinery and equipment components are identified for major repair removed with minimal disruption to production process.	

SUBJECT OUTCOME	
1.4 Work safely with due care for self, fellow workers, machines, equipment, materials and environment.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• A clean and tidy work environment is maintained.	• Clean work environment.
• Waste material is disposed of.	• Dispose of waste materials.
• Applicable health, safety and environmental procedures are adhered to.	• Apply health, safety and environmental procedures.
• Work is carried out in a safe manner in accordance with schedules and manufacturer specifications.	• Carry out work safely in accordance with schedules and manufacturer specifications.

ASSESSMENT TASKS OR ACTIVITIES
• Unsafe conditions are reported. • Work area is restored to a safe and serviceable condition after activity. • The safety guards are used. • Correct coolant is used. • Appropriate personal protective equipment is used.

SUBJECT OUTCOME	
1.5 Explain and discuss potential operational and maintenance problems in the plant.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Discuss the implications of not adhering to the sequence of activities and operational procedures, and of making decisions inappropriate to the task.	• Adhere to the operational procedures. • Make decisions appropriate to the task.
ASSESSMENT TASKS OR ACTIVITIES	
The operational procedures are adhered to.	

Topic 2: Maintain fluid power / pneumatic systems

SUBJECT OUTCOME	
2.1 Plan and prepare for fluid power/pneumatic system maintenance.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Fluid power/pneumatic system maintenance requirements are determined.	• Determine fluid power/pneumatic system maintenance requirements.
• Applicable system for closing down is identified and confirmed *Range: Plan and prepare includes obtaining documentation, interpreting engineering drawings, maintenance schedules and procedures and selecting appropriate tools and equipment.*	• Identify applicable system for closing down. • Interpret engineering drawings. • Adhere to the manufacturer specifications. • Select appropriate tools.
• Making system safe includes isolation, depressurisation and using protective equipment.	• Isolate system. • Depressurise the system.
ASSESSMENT TASKS OR ACTIVITIES	
• Determine fluid power/pneumatic system maintenance requirements. • Identify applicable system for closing down. • Interpret engineering drawings. • Adhere to the manufacturer specifications.	

SUBJECT OUTCOME	
2.2 Prepare site and equipment for maintenance activity.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Site and equipment are prepared for fluid power / pneumatic system maintenance.	• Prepare site for fluid power / pneumatic system maintenance.
• System is depressurised following manufacturer specifications.	• Depressurise system according to manufacturer specification.
• System is confirmed to be isolated.	• Isolate system.
• Provisions for working in a hazardous location are implemented to regulatory and worksite procedures.	• Implement provisions for working in a hazardous location according to regulations and worksite procedures.

ASSESSMENT TASKS OR ACTIVITIES
• Prepare site for fluid power / pneumatic system maintenance. • Depressurise system according to manufacturer specification. • Isolate system. • Implement provisions for working in a hazardous location according to regulations and worksite procedures.

SUBJECT OUTCOME	
2.3 Maintain fluid power / pneumatic system.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Applicable consumables, lubricants and cleaning agents are acquired in the required quantities.	• Acquire applicable consumables, lubricants and cleaning agents in the required quantities.
• Components requiring service are identified and removed without damage to the system or component.	• Identify components requiring service. • Remove components requiring service without damage to the system.
• Removed components are serviced using appropriate tools and equipment	• Service removed components using appropriate tools and equipment.
• Maintained components are replaced without damage to the component or system.	• Replace maintained components without damage to the system.
ASSESSMENT TASKS OR ACTIVITIES	
• Applicable consumables, lubricants and cleaning agents are acquired in the required quantities. • Components requiring service is identified. • Components requiring service is removed without damage to the system. • Removed components are serviced using appropriate tools and equipment. • Maintained components are replaced without damage to the system.	

SUBJECT OUTCOME	
2.4 Apply quality checks on completed work.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Completion of maintenance/service is confirmed and verified.	• Verify completion of maintenance.
• Fluids and levels in the system are checked to meet operational requirements.	• Check that fluids in the system meet operational requirements. • Check levels in the system to meet operational requirements.
• Accumulator pre-charge pressures are visually checked.	• Check accumulator pre-charge pressures.
• Visual plant care inspection is carried out to manufacturer specifications.	• Carry out visual plant care inspection according to manufacturer specifications.
• System performance is confirmed to meet operational requirements.	• Confirm system performance to meet operational requirements.
ASSESSMENT TASKS OR ACTIVITIES	
• Completion of maintenance is verified. • Fluids in the system are checked to meet operational requirements. • Levels in the system are checked to meet operational requirements. • Accumulator pre-charge pressure is checked. • Visual plant care inspection is carried out according to manufacturer specifications. • System performance is confirmed to meet operational requirements.	

SUBJECT OUTCOME	
2.5 Conduct post-repair activities.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Problems are identified.	• Identify problems.
• Accurate and clear information is reported.	• Report accurate and clear information.
ASSESSMENT TASKS OR ACTIVITIES	
• Problem is identified. • Accurate and clear information is reported.	

SUBJECT OUTCOME	
2.6 Care for and store system maintenance tools and equipment.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Compressor maintenance tools and equipment are stored.	• Store compressor maintenance tools and equipment.
• Compressor maintenance tools and equipment are cared for.	• Care for compressor maintenance tools and equipment.
ASSESSMENT TASKS OR ACTIVITIES	
• Compressor maintenance tools and equipment are stored. • Compressor maintenance tools and equipment are cared for.	

SUBJECT OUTCOME	
2.7 Report on fluid power / pneumatic system condition.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The operational procedures are adhered to.	• Adhere to the operational procedures.
• Decisions appropriate to the task are made.	• Make decisions appropriate to the task.
• Student ensures that no delays are caused as a result of poor planning for replacing seals and identifying problems.	• Ensure that no delays are caused as a result of poor planning for replacing seals and identifying problems.
• Fluid power/pneumatic system report is accurate and clear.	• Ensure that fluid power/pneumatic system report is accurate and clear.
ASSESSMENT TASKS OR ACTIVITIES	
The operational procedures are adhered to.	

SUBJECT OUTCOME	
2.8 Discuss and explain incidents and problems related to system maintenance.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Work environment is cleaned.	• Clean work environment.
• Waste materials are disposed of.	• Dispose waste materials.
• Health, safety and environmental procedures are applied.	• Apply health, safety and environmental procedures.
• Work is carried out in a safe manner in accordance with schedules and manufacturer specifications.	• Carry out work safely in accordance with schedules and manufacturer specifications. *Range: Work safely with due care for self, fellow workers, machines, equipment, materials and environment*

ASSESSMENT TASKS OR ACTIVITIES
• Waste materials are disposed. • Safety procedures are followed to specification. *Range: Work safely with due care for self, fellow workers, equipment, materials and environment*

Topic 3: Produce complex components using lathes

SUBJECT OUTCOME	
3.1 Prepare for work activity.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Tools and equipment required for the job are brought. into the work area.	• Bring tools and equipment required for the job into the work area.
• Tools and equipment are checked to ensure that they are in good working condition.	• Check whether tools and equipment are in good working condition.
• The machine is checked to ensure that it is in good working condition.	• Check whether the machine is in good working condition.
• The safety signs are checked to ensure they are appropriately placed.	• Check whether the safety signs are appropriately placed.
• Drawing and job instructions are interpreted and a sequence of operations is determined.	• Interpret drawings and job instructions and determine sequence of operations
• Machine is prepared for operation including lubrication, routine maintenance and pre-operational checks.	• Prepare machine for operation including lubrication, routine maintenance and pre-operational checks.
ASSESSMENT TASKS OR ACTIVITIES	
• The interpretation of drawings and job instructions is clear and precise. • The preparation for machine operation is complete. • The checking of materials and tools required at workstation is correctly done.	

SUBJECT OUTCOME	
3.2 Set lathe.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The gearbox is set to the correct pitch.	• Set the gearbox to the correct pitch.
• The graduated sleeve of the cross slide is set.	• Set the graduated sleeve of the cross-slide.
• The compound slide to zero is set.	• Set the compound slide to zero.
• The carriage is returned to the starting position.	• Return the carriage to the starting position.
• The work piece is mounted in a three or four-jaw chuck.	• Mount the work piece in a three-or four-jaw chuck.
• The work piece is mounted on the lathe spindle.	• Mount the work piece on the lathe spindle.
• The headstock centre is mounted in the spindle.	• Mount the headstock centre in the spindle.
• The venire height gauge is set.	• Set the venire height gauge.
• The set up is clamped securely and checked.	• Clamp securely and check the set-up.
ASSESSMENT TASKS OR ACTIVITIES	
• The gearbox is well set to the correct pitch. • The graduated sleeve of the cross-slide is well set to specification. • The compound slide is set to zero. • The carriage is returned to the starting position. • The work piece is mounted in a three-or four-jaw chuck and lathe spindle. • The head stock centre is mounted in the spindle.	

SUBJECT OUTCOME	
3.3 Perform turning operations.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The correct tool is selected for machining operations.	• Select the correct tool for machining operations.
• The RPM is calculated.	• Calculate the RPM.
• The cutting speed is calculated.	• Calculate the cutting speed.
• Lathe is started up and shut down.	• Start up and shut down lathe.
• Lathe is monitored while in operation and adjustments are made to speeds and feeds where required.	• Monitor lathe while in operation, making adjustments to speeds and feeds where required.
• Machined component is removed on completion of turning process.	• Remove machined component on completion of turning process.
• Lathe is cleaned.	• Clean lathe.
ASSESSMENT TASKS OR ACTIVITIES	
• The correct tool is selected for machining operations. • The RPM and cutting speed is calculated to meet job requirements.	

SUBJECT OUTCOME	
3.4 Apply quality checks on machined component.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Correct tools and equipment are selected for checking.	• Select correct tools and equipment for checking.
• Things to be checked are identified.	• Identify items to be checked.
• Component is measured.	• Measure component.
• A report is written.	• Write a report.
ASSESSMENT TASKS OR ACTIVITIES	
• The appropriate measuring equipment is selected to meet job requirements.	

SUBJECT OUTCOME	
3.5 Record information on work done.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The file is named	• Name the file.
• Information is recorded	• Record information.
• The file is saved.	• Save the file.
• Machined component is checked against specifications	• Check machined component against specifications.
ASSESSMENT TASKS OR ACTIVITIES	
Information on work done is recorded.	

SUBJECT OUTCOME	
3.6 Recognise and report problems, changes and / or malfunctions while operating.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Malfunctions are recognised.	• Recognise malfunctions.
• Malfunctions are reported.	• Report malfunctions.

ASSESSMENT TASKS OR ACTIVITIES
• The component is checked to specifications. • Malfunctions are recognised and reported.

SUBJECT OUTCOME	
3.7 Work safely with due care for self, fellow workers, machines, equipment, materials and environment.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Safe working practices include the use of guards, correct coolants and appropriate personal protective equipment.	• Apply worksite health and safety practices.
• Equipment, material and machines are cleaned after use.	• Clean equipment, materials and machines after use.
• Safety clothes are worn.	• Wear safety clothes.
• Work area is cleaned after working.	• Clean work area after working.
• Good housekeeping is applied.	• Apply good housekeeping.
ASSESSMENT TASKS OR ACTIVITIES	
• Safeguards, correct coolant and appropriate personal protective equipment are correctly and safely used and stored correctly after use. • Workshop safety is practised.	

Topic 4: Produce complex components using milling machines

SUBJECT OUTCOME	
4.1 Prepare for work activity.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Tools and equipment required for the job are brought into the work area.	• Bring tools and equipment required for the job into the work area.
• Tools and equipment are checked to ensure they are in good working condition.	• Check whether tools and equipment are in good working condition.
• The machine is checked to ensure it is in good working condition.	• Check whether the machine is in good working condition.
• The safety signs are checked to ensure they are appropriately placed.	• Check whether the safety signs are appropriately placed.
• Drawings and job instructions are interpreted and a sequence of operations determined.	• Interpret drawings and job instructions and determine sequence of operations.
• Machine is prepared for operation including lubrication, routine maintenance and pre-operational checks.	• Prepare machine for operation including lubrication, routine maintenance and pre-operational checks.
• Components are marked out if required.	• Mark out components if required.
ASSESSMENT TASKS OR ACTIVITIES	
• The interpretation of drawings and job instructions is clear and precise. • The preparation for machine operation is complete. • The checking of materials and tools required at workstation is correctly done.	

SUBJECT OUTCOME	
4.2 Set milling machine.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Type of cutting tool is identified.	• Identify type of cutting tool.
• Calculations are made on the diameter and type of cutter.	• Make calculations on the diameter and type of cutter.
• Calculations are made regarding the RPM	• Make calculations regarding RPM
• Calculations are made regarding the depth of cut.	• Make calculations regarding the depth of cut.
• Calculations are made regarding the feed rate.	• Make calculations regarding the feed rate.
• Indexing is calculated.	• Calculate indexing.
• Clamping arrangement is set.	• Set clamping arrangement.
• Angle plate is set.	• Set angle plate.
• The work piece is positioned correctly.	• Position the work piece correctly.
• Required accessories and work holding fixtures are selected and installed.	• Select and install required accessories and work holding fixtures.
• Required tools are selected, prepared and installed.	• Select, prepare and install required tools.
• Cutting speeds and feeds are selected and set.	• Select and set cutting speeds and feeds.
ASSESSMENT TASKS OR ACTIVITIES	
• The selection of required accessories and work holding fixtures is appropriate. • The installation of required tools is correct. • The selection and setting of cutting speeds and feeds is according to manufacturer's specifications.	

SUBJECT OUTCOME	
4.3 Perform milling operations.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The correct cutter is chosen.	• Choose the correct cutter.
• Cutter is accurately centred.	• Centre cutter accurately.
• Cutter for spline milling is offset.	• Offset cutter for spline milling.
• Milling machine is started up and shut down.	• Start up and shut down milling machine.
• Milling machine is monitored while in operation and adjustments are made to speeds and feeds where required.	• Monitor milling machine while in operation, making adjustments to speeds and feeds where required.
• Machined component is removed on completion of milling process.	• Remove machined component on completion of milling process.
• Milling machine is cleaned.	• Clean milling machine.
ASSESSMENT TASKS OR ACTIVITIES	
• The removal of machined component on completion of milling processes is accurate. • The milling machine is monitored while in operation.	

SUBJECT OUTCOME	
4.4 Apply quality checks on machined component.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The machined component surface is checked to ensure it conforms to the specifications.	• Check that the machined component surface conforms to the specifications.
• Appropriate measuring equipment is selected and prepared.	• Select and prepare appropriate measuring equipment.
• Component is measured.	• Measure component.
ASSESSMENT TASKS OR ACTIVITIES	
The appropriate measuring equipment is prepared and selected and used.	

SUBJECT OUTCOME	
4.5 Recognise and report problems, changes and / or malfunctions while operating.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Problems are recognised.	• Recognise problems.
• Problems are reported.	• Report problems.
• Changes are recognised.	• Recognise changes.
• Changes are reported.	• Report changes.
• Malfunctions are recognised and reported.	• Recognise and report malfunctions.
ASSESSMENT TASKS OR ACTIVITIES	
Machined component is checked against specifications.	

SUBJECT OUTCOME	
4.6 Record information on work done.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The file is named.	• Name the file.
• Information is recorded.	• Record information.
• The file is saved.	• Save the file.
ASSESSMENT TASKS OR ACTIVITIES	
Information is recorded accurately.	

SUBJECT OUTCOME	
4.7 Work safely with due care for self, fellow workers, machines, equipment, materials and environment.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Safe working practices include the use of guards, correct coolants and appropriate personal protective equipment.	• Apply worksite health and safety practices. • Clean equipment, materials and machines after use. • Wear safety clothes. • Clean work area after working. • Apply good housekeeping.
ASSESSMENT TASKS OR ACTIVITIES	
Safeguards, correct coolant and appropriate personal protective equipment are correctly and safely used.	

Topic 5: Produce complex components by performing internal and external grinding operations

SUBJECT OUTCOME	
5.1 Prepare for work activity.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Tools and equipment required for the job in the work area are selected.	• Select tools and equipment required for the job in the work area.
• Tools and equipment are ensured to be in good working condition.	• Check whether tools and equipment are in good working condition.
• The working condition of the machine is checked.	• Check whether the machine is in good working condition.
• The safety signs are appropriately placed.	• Check whether the safety signs are appropriately placed.
• Drawings and job instructions are interpreted and a sequence of operations is determined.	• Interpret drawings and job instructions and determine sequence of operations.
• Machine is prepared for operation including lubrication, routine maintenance and pre-operational checks.	• Prepare machine for operation including lubrication, routine maintenance and pre-operational checks.
• Materials and tools that are required are at the work station.	• Check that materials and tools required are at workstation.
• Components are marked out if required.	• Mark out components if required.
ASSESSMENT TASKS OR ACTIVITIES	
• Tools and equipment required for the job in the work area are selected. • Safety sign, machine and tools and equipment are checked for good working condition.	

SUBJECT OUTCOME	
5.2 Set surface grinding machine.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The correct type of wheel is selected for the specific operation.	• Select the correct type of wheel for the specific operation.
• The wheel is tested for cracks.	• Test the wheel for cracks.
• Wheel speed does not to exceed that recommended by the manufacturer.	• Ensure that wheel speed does not to exceed that recommended by the manufacture.
• The wheel is dressed and balanced.	• Dress and balance the wheel.
• Height of grinding wheel is adjusted.	• Adjust height of grinding wheel.
• Component is correctly positioned on surface grinding table.	• Position component correctly on surface grinding table.
• Required accessories and work holding fixtures are selected and installed.	• Select and install required accessories and work holding fixtures.
• Required tools are selected, prepared and installed.	• Select, prepare and install required tools.
• Cutting speeds and feeds are selected and set.	• Select and set cutting speeds and feeds.
ASSESSMENT TASKS OR ACTIVITIES	
• The selection of required accessories and work holding fixtures is accurate. • The installation of required tools is correct. • The selection and setting of cutting speeds and feeds is according to manufacture specifications.	

SUBJECT OUTCOME	
5.3 Perform surface grinding operations.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Grinding operation application is categorised. *Range: Off-hand, automatic machines, tool making, tool and cutter.*	• Categorise grinding operation application. *Range: Off-hand, automatic machines, tool making, tool and cutter.*
• The type of grinding operations are identified *Range: Peripheral, orbital, face.*	• Identify the type of grinding operations. *Range: Peripheral, orbital, face.*
• External and internal grinding operations are applied.	• Apply external and internal grinding operations.
• The pneumatic, electrical and mechanical grinding operations are known.	• Know the pneumatic, electrical and mechanical grinding operations.
• Surface grinding machine is started up and shut down.	• Start up and shut down surface grinding machine.
• Surface grinding machine is monitored while in operation and adjustments are made to speeds and feeds where required.	• Monitor surface grinding machine while in operation, making adjustments to speeds and feeds where required.
• Machined component is removed on completion of milling process.	• Remove machined component on completion of milling process.
• Surface grinding machine is cleaned.	• Clean surface grinding machine.
ASSESSMENT TASKS OR ACTIVITIES	
• The removing of machined component on completion of milling process is correct. • Monitoring of surface grinding machine is well done according to manufacturing specification.	

SUBJECT OUTCOME	
5.4 Apply quality checks on machined component.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Correct tools and equipment are selected for checking.	• Select correct tools and equipment for checking.
• Items to be checked are identified.	• Identify items to be checked.
• A report is written.	• Write a report.
• Appropriate measuring equipment is selected and prepared.	• Select and prepare appropriate measuring equipment.
• Component is measured.	• Measure component.
ASSESSMENT TASKS OR ACTIVITIES	
• Selection and preparation of measuring equipment is precise. • Component is measured according to specifications.	

SUBJECT OUTCOME	
5.5 Record information on work done.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• File is named, information is recorded and file is saved.	• Name the file. • Record information. • Save the file.
ASSESSMENT TASKS OR ACTIVITIES	
Information on work done is recorded.	

SUBJECT OUTCOME	
5.6 Recognise and report problems, changes and/or malfunctions while operating.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Machined component is checked against specifications.	• Recognise problems. • Report problems. • Recognise changes. • Report changes. • Recognise and report malfunctions.
ASSESSMENT TASKS OR ACTIVITIES	
Machined component is checked against specifications.	

SUBJECT OUTCOME	
5.7 Work safely with due care for self, fellow workers, machines, equipment, materials and environment.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Safe working practices include the use of guards, correct coolants and appropriate personal protective equipment.	• Apply worksite health and safety practices. • Clean equipment, materials and machines after use. • Wear safety clothes. • Clean work area after working. • Apply good housekeeping.
ASSESSMENT TASKS OR ACTIVITIES	
Safeguards, correct coolant and appropriate personal protective equipment are correctly and safely used.	

Topic 6: Write simple computer numerical controlled (CNC) programmes and set and operate a CNC machine

SUBJECT OUTCOME	
6.1 Prepare and write programme.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Speeds, feeds and depth of cut selected in programme are appropriate to produce optimum metal removal rates with material used. *Range: CNC programming is limited to 2D or 2D/3D programmes using M and G codes.*	• Select speeds, feeds and depth of cut in programme appropriate to produce optimum metal removal rates with material used.
ASSESSMENT TASKS OR ACTIVITIES	
Speeds, feeds and depth of cut in programme appropriate to produce optimum metal removal rates with material used are selected.	

SUBJECT OUTCOME	
6.2 Prepare to set machine.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Accessories and work holding fixtures selected are appropriate to task.	• Select accessories and work holding fixtures appropriate to task.
ASSESSMENT TASKS OR ACTIVITIES	
Accessories and work holding fixtures are selected appropriate to task.	

SUBJECT OUTCOME	
6.3 Set machine to perform the specified work.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Machine is set to accept work safely and without damage to work piece or machine	• Set up machine to accept work safely without damage to work piece or machine.
• Tools selected are appropriate to material type and safety requirements	• Select tools appropriate to material type and safety requirements.
ASSESSMENT TASKS OR ACTIVITIES	
• Machine is well set up to accept work safely without damage to work piece or machine. • Tools appropriate to material type and safety requirements are selected.	

SUBJECT OUTCOME	
6.4 Produce sample component.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• CNC Machine operating instructions and worksite procedures adhered to.	• Adhere to CNC machine operating instructions and worksite procedures.
ASSESSMENT TASKS OR ACTIVITIES	
CNC machine operating instructions and worksite procedures are adhered to.	

SUBJECT OUTCOME	
6.5 Operate CNC machine.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• The programme is changed and edited.	• Change and edit programme.
ASSESSMENT TASKS OR ACTIVITIES	
The programme is edited and changed as per operating instructions and worksite procedures.	

SUBJECT OUTCOME	
6.6 Recognise and report problems, changes or malfunctions while operating.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• CNC machine operating instructions and worksite procedures are adhered to.	• Adhere to CNC machine operating instructions. • Adhere to worksite procedures while operating.
• Adjustments during grinding process are made quickly and appropriately.	• Make quick adjustments during CNC machine process. • Make appropriate adjustments.
ASSESSMENT TASKS OR ACTIVITIES	
• CNC machine operating instructions are adhered to. • Worksite procedures while operating are adhered to. • Quick adjustments are well done during CNC machine process. • Appropriate adjustment is done to specification.	

SUBJECT OUTCOME	
6.7 Record information on work done.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• Components are measured and conformance to specification documented.	• Report accurate and clear information. • Name the file. • Record information. • Store information in the appropriate place. • Process CNC machine records. • Complete CNC machine records. • Measure components to conform to specification documentations.
ASSESSMENT TASKS OR ACTIVITIES	
• Accurate and clear information is reported. • CNC machine records are processed. • CNC machine records are completed. • Components are measured to conform to specification documentations.	

SUBJECT OUTCOME	
6.8 Work safely with due care for self, fellow workers, machines, equipment, materials and environment.	
ASSESSMENT STANDARD	**LEARNING OUTCOME**
• A clean and tidy work environment is maintained.	• Clean work environment.
• Waste material is disposed of.	• Dispose waste materials.
• Applicable health, safety and environmental procedures are adhered to.	• Apply health, safety and environmental procedures.
• Work is carried out in safely in accordance with schedules and manufacturer specifications.	• Work safely in accordance with schedules and manufacturer specifications.
ASSESSMENT TASKS OR ACTIVITIES	
Workshop safety is practised.	

4 SPECIFICATIONS FOR EXTERNAL ASSESSMENT IN FITTING AND TURNING - LEVEL 4

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 student's 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 during 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 during 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).

3.1 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 is suggested:

LEVEL 4	KNOWLEDGE AND COMPREHENSION	APPLICATION	ANALYSIS, SYNTHESIS AND EVALUATION
	40%	50%	10%