



**education**

Department:  
Education  
REPUBLIC OF SOUTH AFRICA

# **NATIONAL CERTIFICATES (VOCATIONAL)**

## **ASSESSMENT GUIDELINES**

# **ENGINEERING PRACTICE AND MAINTENANCE**

## **NQF Level 3**

September 2007



# **ENGINEERING PRACTICE AND MAINTENANCE – LEVEL 3**

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## 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 Engineering Fundamentals, Engineering Practice and Maintenance and Engineering Processes 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: Engineering Practice and Maintenance* to prepare for and deliver Engineering Practice and Maintenance. 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 Portfolio of Evidence (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 their 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 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 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.

<b>LECTURER ASSESSMENT</b>	The lecturer assesses students' performance against given criteria in different contexts, such as individual work, group work, etc.
<b>SELF-ASSESSMENT</b>	Students assess their own performance against given criteria in different contexts, such as individual work, group work, etc.
<b>PEER ASSESSMENT</b>	Students assess another student's or group of students' performance against given criteria in different contexts, such as individual work, group work, etc.
<b>GROUP ASSESSMENT</b>	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)
<b>Assessment instruments</b>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Class questions</li> <li>• Lecturer, student, parent discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Assignments or tasks</li> <li>• Projects</li> <li>• Investigations or research</li> <li>• Case studies</li> <li>• Practical exercises</li> <li>• Demonstrations</li> <li>• Role-play</li> <li>• Interviews</li> </ul>	<ul style="list-style-type: none"> <li>• Examinations</li> <li>• Class tests</li> <li>• Practical examinations</li> <li>• Oral tests</li> <li>• Open-book tests</li> </ul>
<b>Assessment tools</b>	<ul style="list-style-type: none"> <li>• Observation sheets</li> <li>• Lecturer's notes</li> <li>• Comments</li> </ul>	<ul style="list-style-type: none"> <li>• Checklists</li> <li>• Rating scales</li> <li>• Rubrics</li> </ul>	<ul style="list-style-type: none"> <li>• Marks (e.g. %)</li> <li>• Rating scales (1-7)</li> </ul>
<b>Evidence</b>	<ul style="list-style-type: none"> <li>• Focus on individual students</li> <li>• Subjective evidence based on lecturer observations and impressions</li> </ul>	<p><b>Open middle:</b> Students produce the same evidence but in different ways.</p> <p><b>Open end:</b> 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. 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 ENGINEERING PRACTICE AND MAINTENANCE

### 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 Engineering Practice and Maintenance 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

Engineering Practice and Maintenance, 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	40-48
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 PoE, its exact location must be recorded and it must be readily available for moderation purposes.

The following units guide internal assessment in Engineering Practice and Maintenance Level 3:

<b>NUMBER OF UNITS</b>	<b>ASSESSMENT</b>	<b>COVERAGE</b>
2	Formal written tests	One or more completed topics
1	Internal written exams	All completed topics
3	Practical assessments	Must cover the related Subject Outcomes: For example assignments, projects

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### 3 INTERNAL ASSESSMENT OF SUBJECT OUTCOMES IN ENGINEERING PRACTICE AND MAINTENANCE - LEVEL 3

#### Topic 1: Technological solutions in engineering

SUBJECT OUTCOME	
<b>1.1 Explain different forms of information, communication and technologies used in engineering</b>	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> <li>Forms of information, communication and technologies are identified and used to produce solutions. <i>Range: Technological solutions also include modifications and upgrades.</i></li> </ul>	<ul style="list-style-type: none"> <li>Identify forms of information, communication and technologies in terms of their characteristics.</li> <li>Decide on information, communication and technology that can be used to produce solutions. <i>Range: Technological solutions also include modifications and upgrades.</i></li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> <li>Written test on information technology.</li> <li>Research forms of information technology.</li> <li>Worksheets on considering items in the range when using information processing.</li> </ul>	

SUBJECT OUTCOME	
<b>1.2 Use information, communication and technologies to develop a solution for a given design problem</b>	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> <li>Existing solutions to similar problems are described and developed in terms of its design process.</li> </ul>	<ul style="list-style-type: none"> <li>Describe existing solutions to similar problems.</li> <li>Decide on a solution in order to solve the design problem according to its design process.</li> <li>Develop a solution for the design problem.</li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
Case study on problem design	

SUBJECT OUTCOME	
<b>1.3 Test and evaluate the solution and make the necessary modifications.</b>	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> <li>Information, communication and technologies used are tested and evaluated.</li> </ul>	<ul style="list-style-type: none"> <li>Compare methods of testing and evaluation.</li> <li>Test and evaluate information, communication and technologies against the given specifications of the design problem.</li> </ul>
<ul style="list-style-type: none"> <li>Modifications are identified and where necessary, implemented to solve the design problem.</li> </ul>	<ul style="list-style-type: none"> <li>Identify modifications where necessary.</li> <li>Make any necessary modifications and justify the solution in terms of the given design problem.</li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
Case study on testing and evaluation including modifications.	

## Topic 2: Systematic fault-finding techniques

SUBJECT OUTCOME	
2.1 Research systematic fault finding techniques that can be used to locate a fault	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> <li>Fault finding techniques are listed and discussed.</li> </ul>	<ul style="list-style-type: none"> <li>List fault finding techniques from manufacturer's manuals and other resources</li> <li>Discuss different fault finding techniques</li> </ul>
<ul style="list-style-type: none"> <li>Positive and negative techniques are discussed</li> </ul>	<ul style="list-style-type: none"> <li>Discuss positive and negative aspects of different techniques</li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
Written tests on fault finding techniques.	

SUBJECT OUTCOME	
2.2 Identify symptoms of a fault	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> <li>Methods of identifying symptoms of faults are listed</li> </ul>	<ul style="list-style-type: none"> <li>List methods of identifying symptoms of faults</li> </ul>
<ul style="list-style-type: none"> <li>The methods "questioning the customer and direct observation" are used to identify symptoms</li> </ul>	<ul style="list-style-type: none"> <li>Identify symptoms by using the methods, questioning the customer and direct observation for the identification</li> </ul>
<ul style="list-style-type: none"> <li>A fault is diagnosed from the collected data and information without specifying the cause of the fault yet.</li> </ul>	<ul style="list-style-type: none"> <li>Use data and information collected and make a diagnosis of the fault but withhold from specifying the cause of the fault until after investigation.</li> </ul>
<ul style="list-style-type: none"> <li>Symptoms are separated into relevant and irrelevant symptoms.</li> </ul>	<ul style="list-style-type: none"> <li>Separate relevant symptoms from irrelevant symptoms and identify their side effects</li> </ul>
<ul style="list-style-type: none"> <li>The cause of the fault is identified from relevant symptoms</li> </ul>	<ul style="list-style-type: none"> <li>Identify the cause of the fault obtained from relevant symptoms</li> </ul>
<ul style="list-style-type: none"> <li>Positive and negative techniques are discussed</li> </ul>	<ul style="list-style-type: none"> <li>Discuss positive and negative aspects of different techniques</li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> <li>Worksheets and case studies of fault finding symptoms</li> <li>Case studies and practical assignments on locating faults and determining their causes.</li> <li>Communicate the appropriate procedure to be used to personnel.</li> <li>Record all details of the fault and the procedure used to rectify the fault.</li> </ul>	

SUBJECT OUTCOME	
2.3 Locate faults in electrical and/or mechanical appliances and determine their cause.	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> <li>Techniques used to locate faults are discussed and faults are located.</li> </ul>	<ul style="list-style-type: none"> <li>Discuss techniques used to locate electrical and/or mechanical faults.</li> <li>Locate a fault and deduce a cause that is supported by direct observation and measurements.</li> </ul>
<ul style="list-style-type: none"> <li>Faults and their causes are located.</li> </ul>	<ul style="list-style-type: none"> <li>Locate a fault and deduce a cause without trial and error replacement of parts.</li> <li>Locate a fault and deduce cause by making use of manufacturer's servicing data and drawings.</li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> <li>Case studies and practical assignments on locating faults and determining their causes.</li> <li>Communicate the appropriate procedure to be used to personnel.</li> <li>Record all details of the fault and the procedure used to rectify the fault.</li> </ul>	

### Topic 3: Diagnosis of mechanical and electrical faults in engineering

SUBJECT OUTCOME	
<b>3.1 Evaluate the principles of faultfinding diagnoses in the engineering industry.</b>	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> <li>The principles of faultfinding diagnostics are listed and discussed in terms of their symptoms, faults and causes.</li> </ul>	<ul style="list-style-type: none"> <li>List the principles of fault finding diagnostics.</li> <li>Discuss these principles in terms of the systematic investigation of symptoms, fault and cause effects.</li> </ul>
<ul style="list-style-type: none"> <li>Principles are analysed as a process or a process within a system.</li> </ul>	<ul style="list-style-type: none"> <li>Analyse principles as a process, or as a process within a system.</li> </ul>
<ul style="list-style-type: none"> <li>Inputs and outputs are evaluated against diagnosed faults.</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate relevant inputs and outputs against diagnosed faults.</li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
Written test and written assignment on principles of fault finding.	

SUBJECT OUTCOME	
<b>3.2 Evaluate the systematic approach to fault location.</b>	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> <li>The systematic approached is analysed in terms of symptoms and causes</li> </ul>	<ul style="list-style-type: none"> <li>Analyse the systematic approach to fault location in terms of the difference between a symptom and a cause.</li> </ul>
<ul style="list-style-type: none"> <li>Systematic and random search methods are contrasted.</li> </ul>	<ul style="list-style-type: none"> <li>Analyse the systematic approach to fault location in terms of common aids to fault location and examples of their application in fault location.</li> <li>Contrast systematic search methods with the random search method and examples of their application in fault location</li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> <li>Case study on the difference between symptoms and causes.</li> <li>Assignment and test on fault location.</li> </ul>	

SUBJECT OUTCOME	
<b>3.3 Investigate and use appropriate procedures to rectify faults.</b>	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> <li>Procedures and responsibility for fault rectification are identified.</li> </ul>	<ul style="list-style-type: none"> <li>Identify causes of a fault in a specific situation</li> <li>Identify procedures that can be used to fix a fault.</li> </ul>
<ul style="list-style-type: none"> <li>Appropriate procedures for fault rectification are decided upon.</li> </ul>	<ul style="list-style-type: none"> <li>Decide on the appropriate method to rectify the fault.</li> </ul>
<ul style="list-style-type: none"> <li>Channels of notification are identified and appropriate information is sent through this channel.</li> </ul>	<ul style="list-style-type: none"> <li>Identify channels to be used to notify personnel about the fault and the procedure used to rectify the problem.</li> <li>Send information on the appropriate procedure used for rectification.</li> </ul>
<ul style="list-style-type: none"> <li>All details on the fault are recorded.</li> </ul>	<ul style="list-style-type: none"> <li>Record all details of the fault and the procedure used to rectify the fault</li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> <li>Written assignment on systematic and random search methods.</li> <li>Assignment on procedures used to rectify a fault.</li> </ul>	

<b>SUBJECT OUTCOME</b>	
<b>3.4 Explain the systematic collection and analysis of evidence to identify symptoms of a fault.</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>The five step method to fault finding is explained.</li> </ul>	<ul style="list-style-type: none"> <li>Explain the systematic collection of evidence in terms of the five-step approach to fault finding.</li> </ul>
<ul style="list-style-type: none"> <li>Use definition of a symptom as a sign that can help locate a fault.</li> </ul>	<ul style="list-style-type: none"> <li>Explain the systematic collection of evidence in terms of defining a symptom as a sign, to help in locating a fault.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
<ul style="list-style-type: none"> <li>Written test on five step method.</li> <li>Work sheet on instances where a symptom is a sign that assists in finding a fault.</li> </ul>	

#### Topic 4: Lubricants and lubrication systems

<b>SUBJECT OUTCOME</b>	
<b>4.1 Explain and interpret lubrication principles and characteristics.</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>Different types of lubricants are identified</li> </ul>	<ul style="list-style-type: none"> <li>Identify different types of lubricants available.</li> </ul>
<ul style="list-style-type: none"> <li>Lubrication principles and the performance characteristics are described</li> </ul>	<ul style="list-style-type: none"> <li>Discuss lubrication principles</li> <li>Describe lubricants in terms of performance characteristics</li> </ul>
<ul style="list-style-type: none"> <li>The role of lubricants in machine components and its operations are described and interpreted.</li> </ul>	<ul style="list-style-type: none"> <li>Describe lubricants in terms of their role in machine components</li> </ul>
<ul style="list-style-type: none"> <li>Information about lubricants that meet machine operation requirements is accessed and interpreted</li> </ul>	<ul style="list-style-type: none"> <li>Access and interpret information about lubricants to meet machine operation requirements.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
<ul style="list-style-type: none"> <li>Written test on lubrication principles and characteristics.</li> <li>Written test on lubrication systems.</li> <li>Written test and assignment on lubrication system faults.</li> </ul>	

<b>SUBJECT OUTCOME</b>	
<b>4.2 Inspect lubrication systems.</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>Different lubrication systems are listed.</li> </ul>	<ul style="list-style-type: none"> <li>List different lubrication systems.</li> </ul>
<ul style="list-style-type: none"> <li>The type of lubrication system to be inspected is identified.</li> </ul>	<ul style="list-style-type: none"> <li>Identify the type of lubrication system to be inspected..</li> </ul>
<ul style="list-style-type: none"> <li>Lubrication requirements are determined and systems are checked to conform to manufacturer's specifications.</li> </ul>	<ul style="list-style-type: none"> <li>Determine lubrication requirements for the system from information sources.</li> </ul>
<ul style="list-style-type: none"> <li>System faults are diagnosed and corrective action is taken.</li> </ul>	<ul style="list-style-type: none"> <li>Check system for conformance in accordance with manufacturer's specifications and worksite procedures.</li> <li>Diagnose system faults and take corrective actions in accordance with worksite procedures.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
Practical assignments on lubrication systems.	

<b>SUBJECT OUTCOME</b>	
<b>4.3 Explain different lubrication system faults</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• Typical faults related to a selected system are described and fault-testing methods identified</li> </ul>	<ul style="list-style-type: none"> <li>• Describe typical faults related to the system selected.</li> <li>• Identify fault-testing methods related to the system selected.</li> </ul>
<ul style="list-style-type: none"> <li>• Fault-recording techniques are described in accordance with worksite procedures.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe fault-recording techniques in accordance with worksite procedures</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
Practical assignments on lubrication systems	

### Topic 5: Maintenance of plant and equipment in engineering

<b>SUBJECT OUTCOME</b>	
<b>5.1 Describe plant and equipment currently used in engineering and explain the principles for correct usage.</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• Plant and engineering equipment are listed and their purpose and principles for correct usage are determined.</li> </ul>	<ul style="list-style-type: none"> <li>• List different plant and engineering equipment.</li> <li>• Determine the purpose of plant and engineering equipment according to manufacturer's specifications and company policy.</li> <li>• Identify principles of operation of plant and engineering equipment according to manufacturer's specifications and company policy.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
Written test and work sheets on plant and engineering equipment.	

<b>SUBJECT OUTCOME</b>	
<b>5.2 Explain and demonstrate safety procedures when using plant and engineering equipment</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• Safety procedures for the use of plant and engineering equipment are described.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe safety procedures when using plant and engineering equipment according to manufacturer's specifications, company policy, and legislation.</li> </ul>
<ul style="list-style-type: none"> <li>• Safety procedures are adhered to when using hazardous equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• Use correct safety procedures when operating potentially hazardous/dangerous equipment.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
Written test on safety procedures for engineering plant and equipment.	

<b>SUBJECT OUTCOME</b>	
<b>5.3 Select and use plant and engineering equipment relevant to the workplace</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• Relevant equipment is selected and correctly used for a specific task.</li> </ul>	<ul style="list-style-type: none"> <li>• Select suitable equipment for a relevant task according to the purpose of the designed equipment.</li> <li>• Use the selected piece of equipment according to manufacturer's specifications and company policy.</li> </ul>
<ul style="list-style-type: none"> <li>• Safe working practises are applied during the use of equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• Adhere to safe working practises throughout the usage of equipment.</li> </ul>
<ul style="list-style-type: none"> <li>• Equipment is shut down and stored appropriately.</li> </ul>	<ul style="list-style-type: none"> <li>• Shut down and store equipment in- accordance to the workplace and manufacturer's specifications.</li> </ul>



<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
<ul style="list-style-type: none"> <li>• Practical task to observe selection and use of plant and engineering equipment, using safe working practises.</li> <li>• Practical assignment on the storage of equipment.</li> </ul>	
<b>SUBJECT OUTCOME</b>	
<b>5.4 Maintain plant and engineering equipment.</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• Maintenance policy and procedures are read and familiarised with</li> </ul>	<ul style="list-style-type: none"> <li>• Familiarise oneself with the maintenance policy and procedures for plant and engineering equipment.</li> </ul>
<ul style="list-style-type: none"> <li>• Ensure work area is cleaned, and equipment cleaned and stored according to specifications, policy and procedures.</li> </ul>	<ul style="list-style-type: none"> <li>• Clean plant and equipment after usage according to specifications, policy and procedures.</li> </ul>
<ul style="list-style-type: none"> <li>• Equipment is maintained according to specifications.</li> </ul>	<ul style="list-style-type: none"> <li>• Store plant and equipment in a proper place to prevent any damages.</li> <li>• Inspect plant and equipment to ensure it is in a safe working condition according to manufacturer's specifications and company policy</li> </ul>
<ul style="list-style-type: none"> <li>• Safe working practises are applied during the maintenance of equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• Adhere to safe working practices throughout the maintenance procedures.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
<ul style="list-style-type: none"> <li>• Written test on maintenance of equipment.</li> <li>• Written test and practical assignment on storing of equipment.</li> <li>• Practical assignment on maintenance of plant and engineering equipment.</li> </ul>	

## 4 SPECIFICATIONS FOR EXTERNAL ASSESSMENT IN ENGINEERING PRACTICE AND MAINTENANCE - LEVEL 3

### 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 is suggested:

LEVEL 3	<b>KNOWLEDGE AND COMPREHENSION</b>	<b>APPLICATION</b>	<b>ANALYSIS, SYNTHESIS AND EVALUATION</b>
	40%	40%	20%