



**education**

Department:  
Education  
REPUBLIC OF SOUTH AFRICA

# **NATIONAL CERTIFICATES (VOCATIONAL)**

## **ASSESSMENT GUIDELINES**

### **ENGINEERING SYSTEMS**

#### **NQF LEVEL 2**

September 2007



# CONTENTS

## **SECTION A: PURPOSE OF THE SUBJECT ASSESSMENT GUIDELINES**

## **SECTION B: ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)**

- 1 Assessment in the National Certificates (Vocational)**
- 2 Assessment framework for vocational qualifications**
  - 2.1 Internal continuous assessment (ICASS)
  - 2.2 External summative assessment (ESASS)
- 3 Moderation of assessment**
  - 3.1 Internal moderation
  - 3.2 External moderation
- 4 Period of validity of internal continuous assessment (ICASS)**
- 5 Assessor requirements**
- 6 Types of assessment**
  - 6.1 Baseline assessment
  - 6.2 Diagnostic assessment
  - 6.3 Formative assessment
  - 6.4 Summative assessment
- 7 Planning assessment**
  - 7.1 Collecting evidence
  - 7.2 Recording
  - 7.3 Reporting
- 8 Methods of assessment**
- 9 Instruments and tools for collecting evidence**
- 10 Tools for assessing student performance**
- 11 Selecting and/or designing recording and reporting systems**
- 12 Competence descriptions**
- 13 Strategies for collecting evidence**
  - 13.1 Record sheets
  - 13.2 Checklists

## **SECTION C: ASSESSMENT IN ENGINEERING SYSTEMS**

- 1 Schedule of assessment**
- 2 Recording and reporting**
- 3 Internal assessment of Subject Outcomes in Engineering Systems – Level 2**
- 4 Specifications for the external assessment in Engineering Systems – Level 2**
  - 4.1 Integrated summative assessment task (ISAT)
  - 4.2 National examination

## 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 Systems, Engineering Graphics and Design (CAD) and Applied Engineering Technology 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 Systems* to prepare for and deliver Engineering Systems, Engineering Graphics and Design (CAD) and Applied Engineering Technology. 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 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 Portfolio of Evidence (PoE).

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

	METHODS FOR COLLECTING EVIDENCE		
	Observation-based (Less structured)	Task-based (Structured)	Test-based (More structured)
<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. They consist of short statements describing the expected performance in a particular task. The statements on the checklist can be ticked off when the student has adequately achieved the criterion. Checklists and task lists are useful in peer or group assessment activities.

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

## 11 SELECTING AND/OR DESIGNING RECORDING AND REPORTING SYSTEMS

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

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

## 12 COMPETENCE DESCRIPTIONS

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

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



### 13 STRATEGIES FOR COLLECTING EVIDENCE

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

#### 13.1 Record sheets

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

#### 13.2 Checklists

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

## SECTION C: ASSESSMENT IN ENGINEERING SYSTEMS, ENGINEERING GRAPHICS AND DESIGN (CAD) AND APPLIED ENGINEERING TECHNOLOGY

### 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 Portfolio of Evidence (PoE) account for the other 50 percent.

The Portfolio of Evidence (PoE) and the external assessment include practical and written components. The practical assessment in Engineering Systems 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 Systems, Engineering Graphics and Design (CAD) and Applied Engineering Technology, 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 should at least 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 Portfolio of Evidence (PoE) must at least include:

- 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 tasks cannot be contained as evidence in the Portfolio of Evidence (PoE), its exact location must be recorded and it must be readily available for moderation purposes.

**ASSESSMENT OF ENGINEERING SYSTEMS**  
**LEVEL 2**

### 3 INTERNAL ASSESSMENT OF OUTCOMES IN ENGINEERING SYSTEMS – LEVEL 2

#### Topic 1: Engineering Systems and Their Applications

<b>SUBJECT OUTCOME</b>	
<b>Identify various engineering systems.</b>	
<b>ASSESSMENT STANDARDS</b>	<b>LEARNING OUTCOMES</b>
<ul style="list-style-type: none"> <li>• Various engineering systems are identified and discussed according to their functions.</li> <li>• The understanding of various systems and their outputs is demonstrated by an explanation of the roles and functions.</li> <li>• Components of various engineering systems are identified and discussed and their functions are explained.</li> <li>• The functions of components of various engineering systems are discussed.</li> <li>• The different symbols used to represent different components in engineering systems are correctly identified and used.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and discuss various engineering systems (electrical, electronic, mechanical, hydraulic, pneumatic, etc.).</li> <li>• Identify and discuss the components of engineering systems and their functions.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
<ul style="list-style-type: none"> <li>• Assignment</li> <li>• Role-play</li> <li>• Test or examinations</li> <li>• Demonstrations</li> </ul>	

<b>SUBJECT OUTCOME</b>	
<b>Discuss safety measures relating to different engineering systems.</b>	
<b>ASSESSMENT STANDARDS</b>	<b>LEARNING OUTCOMES</b>
<ul style="list-style-type: none"> <li>• Safety measures to be observed when dealing with each system are identified according to system procedures.</li> <li>• Relevant preventative and corrective actions for each system are identified and understood.</li> <li>• Non-adherence to safety measures for each system is discussed.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify safety measures to be observed when dealing with different engineering systems.</li> <li>• Discuss the implications of non-adherence to safety measures as stipulated by the manufacturers.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
<ul style="list-style-type: none"> <li>• Assignment</li> <li>• Role-play</li> <li>• Test or examinations</li> <li>• Demonstrations</li> </ul>	

<b>SUBJECT OUTCOME</b>	
<b>Select engineering systems applications.</b>	
<b>ASSESSMENT STANDARDS</b>	<b>LEARNING OUTCOMES</b>
<ul style="list-style-type: none"> <li>• Engineering systems applications are identified according to the design.</li> <li>• Components of each systems application are identified according to the design.</li> <li>• Functions of each component of the systems application are identified.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify a variety of engineering systems applications (e.g. gear trains and brake system).</li> <li>• Discuss the functions of each system's application.</li> </ul>

<b>ASSESSMENT TASKS OR ACTIVITIES</b>
<ul style="list-style-type: none"> <li>• Assignment</li> <li>• Role-play</li> <li>• Test or examinations</li> <li>• Demonstrations</li> </ul>

<b>SUBJECT OUTCOME</b>	
<b>Prepare and set up engineering systems for operation.</b>	
<b>ASSESSMENT STANDARDS</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• Safety precautions to be observed when dealing with engineering systems applications are discussed.</li> <li>• Engineering systems applications are checked to determine if they are ready for operation (e.g. check fluid level, air pressure, cable connections and pipe connections).</li> <li>• Identified problems are reported to the supervisor.</li> <li>• An engineering system application for operation is set up</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare engineering systems applications for operation.</li> <li>• Set up an engineering systems application for operation.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
<ul style="list-style-type: none"> <li>• Assignment</li> <li>• Role-play</li> <li>• Test or examinations</li> <li>• Demonstrations</li> </ul>	

<b>SUBJECT OUTCOME</b>	
<b>Do basic calculations on engineering systems.</b>	
<b>ASSESSMENT STANDARDS</b>	<b>LEARNING OUTCOMES</b>
<ul style="list-style-type: none"> <li>• Concepts like power, efficiency, speed, velocity, work done, resistance, etc. are defined.</li> <li>• The relationship between these concepts and engineering systems are indicated.</li> <li>• Basic calculations are carried out to determine the outputs using relevant formulae and system information.</li> </ul>	<ul style="list-style-type: none"> <li>• Define a variety of outputs for engineering systems.</li> <li>• By means of simple calculations, determine a variety of outputs for each engineering system.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
<ul style="list-style-type: none"> <li>• Assignment</li> <li>• Role-play</li> <li>• Test or examinations</li> <li>• Demonstrations</li> </ul>	

<b>SUBJECT OUTCOME</b>	
<b>Maintain engineering systems.</b>	
<b>ASSESSMENT STANDARDS</b>	<b>LEARNING OUTCOMES</b>
<ul style="list-style-type: none"> <li>• Problems and corrective action are taken, following the workshop manual or manufacturer's recommendations.</li> <li>• The purpose of caring for engineering systems applications is discussed.</li> <li>• Engineering systems applications are cared for as recommended by the manufacturer.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify consumables needed to maintain engineering systems applications.</li> <li>• Care for engineering systems applications.</li> </ul>

<b>ASSESSMENT TASKS OR ACTIVITIES</b>
<ul style="list-style-type: none"> <li>• Assignment</li> <li>• Role-play</li> <li>• Test or examinations</li> <li>• Demonstrations</li> </ul>

### Topic 2: Equipment with Simple Control Systems

<b>SUBJECT OUTCOME</b>	
<b>Identify equipment with simple control systems.</b>	
<b>ASSESSMENT STANDARDS</b>	<b>LEARNING OUTCOMES</b>
<ul style="list-style-type: none"> <li>• Define simple control systems.</li> <li>• Equipment with simple control systems are identified by referring to its design and core functions.</li> <li>• Control functions are listed.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify equipment with simple control systems.</li> <li>• List the functions of equipment with simple control systems.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
<ul style="list-style-type: none"> <li>• Assignment</li> <li>• Role-play</li> <li>• Test or examinations</li> <li>• Demonstrations</li> </ul>	

<b>SUBJECT OUTCOME</b>	
<b>Discuss safety precautions to be observed when operating equipment with simple control systems.</b>	
<b>ASSESSMENT STANDARDS</b>	<b>LEARNING OUTCOMES</b>
<ul style="list-style-type: none"> <li>• Incidents and problems related to the equipment and equipment set-up and operations are explained and discussed.</li> <li>• Corrective and preventative measures are discussed.</li> <li>• Implications of non-conformance when operating equipment with simple control systems are discussed.</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss safety precautions to be observed when dealing with equipment with simple control systems.</li> <li>• Discuss the implications of non-conformance with the manufacturer's specifications when operating equipment with simple control systems.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
<ul style="list-style-type: none"> <li>• Assignment</li> <li>• Role-play</li> <li>• Test or examinations</li> <li>• Demonstrations</li> </ul>	

<b>SUBJECT OUTCOME</b>	
<b>Set up and operate equipment with simple control systems.</b>	
<b>ASSESSMENT STANDARDS</b>	<b>LEARNING OUTCOMES</b>
<ul style="list-style-type: none"> <li>• Data is collected from the service manual of the equipment.</li> <li>• Record of past performance of the equipment is obtained.</li> <li>• A draft plan of operation is produced.</li> <li>• The equipment is isolated.</li> <li>• Necessary adjustments are made on the equipment following the manufacturer's recommendations.</li> <li>• The equipment following is started using the correct procedure.</li> <li>• The equipment is monitored while in operation.</li> </ul>	<ul style="list-style-type: none"> <li>• Draft a plan of operation.</li> <li>• Adjust settings of start and operate equipment.</li> <li>• Monitor and adjust the process as required.</li> </ul>

<b>ASSESSMENT TASKS OR ACTIVITIES</b>
<ul style="list-style-type: none"> <li>• Assignment</li> <li>• Role-play</li> <li>• Test or examinations</li> <li>• Demonstrations</li> </ul>

<b>SUBJECT OUTCOME</b>	
<b>Maintain equipment with simple control systems.</b>	
<b>ASSESSMENT STANDARDS</b>	<b>LEARNING OUTCOMES</b>
<ul style="list-style-type: none"> <li>• Data regarding the care for and maintenance of the equipment is collected from the manufacturer's guide.</li> <li>• The equipment is started to check if it is running according to specifications.</li> <li>• A post-maintenance report is compiled and forwarded to the supervisor.</li> </ul>	<ul style="list-style-type: none"> <li>• Care for and maintain equipment with simple control systems.</li> <li>• Start the equipment after maintenance.</li> <li>• Compile a post-maintenance report and submit it to the supervisor or assessor.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
<ul style="list-style-type: none"> <li>• Assignment</li> <li>• Role-play</li> <li>• Test or examinations</li> <li>• Demonstrations</li> </ul>	

### Topic 3: Routine Maintenance

<b>SUBJECT OUTCOME</b>	
<b>Plan and prepare for routine maintenance.</b>	
<b>ASSESSMENT STANDARDS</b>	<b>LEARNING OUTCOMES</b>
<ul style="list-style-type: none"> <li>• Service records for machinery or equipment are obtained from supervisors.</li> <li>• Manufacturer's maintenance procedures are obtained from the service manuals.</li> <li>• A service plan for the machinery or equipment is compiled.</li> <li>• Evaluate the machinery or equipment condition. (oil levels, chain condition, sprocket condition, "V" belts, etc.).</li> <li>• A report on machine condition is compiled and forwarded to the supervisor or assessor.</li> <li>• Tools to be used during routine maintenance are identified.</li> <li>• All consumables needed during routine maintenance are identified.</li> <li>• Machines or equipment are cleaned before routine maintenance commences.</li> </ul>	<ul style="list-style-type: none"> <li>• Plan a routine maintenance programme.</li> <li>• Perform a pre-operational inspection on machinery or equipment.</li> <li>• Prepare machinery or equipment for routine maintenance.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
<ul style="list-style-type: none"> <li>• Routine maintenance plan for different machines: <ul style="list-style-type: none"> <li>▪ Draw a flow diagram.</li> <li>▪ Compare various plans</li> <li>▪ Choose the right tools and consumables for routine maintenance.</li> </ul> </li> <li>• Assignment</li> <li>• Role-play</li> <li>• Test or examinations</li> <li>• Demonstrations</li> </ul>	

SUBJECT OUTCOME	
Perform routine maintenance.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>• Safety precautions with regard to maintenance are discussed.</li> <li>• Implications of not performing routine maintenance are discussed.</li> <li>• Machine or equipment isolation procedures are obtained from the machine or equipment manual.</li> <li>• Machinery or equipment is isolated before routine maintenance is carried out.</li> <li>• Routine maintenance procedures are carried out according to schedules.</li> <li>• The machine or equipment is started following the start-up procedures in the manual.</li> <li>• A post-maintenance report is compiled and forwarded to the supervisor or assessor.</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss safety precautions with regard to maintenance.</li> <li>• Isolate machinery or equipment for routine maintenance.</li> <li>• Perform routine maintenance.</li> <li>• Start the machine or equipment.</li> <li>• Write a post-maintenance report.</li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> <li>• Demonstration: Explain the safety precautions to be observed when maintaining machinery.</li> <li>• Assignment</li> <li>• Role-play</li> <li>• Test or examinations</li> <li>• Demonstrations</li> </ul>	

#### 4 SPECIFICATIONS FOR EXTERNAL ASSESSMENT IN ENGINEERING SYSTEMS – LEVEL 2

##### 4.1 Integrated summative assessment task (ISAT)

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

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

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

**OR**

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

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

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

##### 4.2 National Examination

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

LEVEL 2	KNOWLEDGE AND COMPREHENSION	APPLICATION	ANALYSIS, SYNTHESIS AND EVALUATION
	50%	40%	10%