education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATES (VOCATIONAL)

ASSESSMENT GUIDELINES

ELECTRICAL PRINCIPLES AND PRACTICE
NQF LEVEL 2

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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 Electrical Principles and Practice 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: Electrical Principles and Practice* to prepare for and deliver Electrical Principles and Practice. 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 assuror; 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.

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

9 INSTRUMENTS AND TOOLS FOR COLLECTING EVIDENCE

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

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

	METHODS FOR COLLECTING EVIDENCE		
	Observation-based (Less structured)	**Task-based** (Structured)	**Test-based** (More structured)
Assessment instruments	• 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. 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 ELECTRICAL PRINCIPLES AND PRACTICE

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 Electrical Principles and Practice 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

Electrical Principles and Practice, 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

ELECTRICAL PRINCIPLES AND PRACTICE

LEVEL 2

3 INTERNAL ASSESSMENT OF SUBJECT OUTCOMES IN ELECTRICAL PRINCIPLES AND PRACTICE – LEVEL 2

Topic 1: Electric and Magnetic Theory

SUBJECT OUTCOME	
Understand fundamentals of electricity (p.d., e.m.f., current flow [conventional and electron], resistance and power and energy).	
ASSESSMENT STANDARDS	**LEARNING OUTCOMES**
• The science of electricity is understood. • The relationship between electric current, potential difference and resistance is understood. • The relationship between electric power and electric energy is understood. • The units of measurement of electric entities are understood. • The relationships between electric entities are demonstrated in a practical example.	• Recall the definitions verbally and in writing. *Range: Atom, electron, free electron, ionized atom, positive and negative charge, conductors and insulators, potential difference, electromotive force, conventional and electron current flow, resistance and Ohm's law, power and energy* • State the units of measurement of the entities verbally and in writing. *Range: Potential difference, electromotive force, conventional and electron current flow, resistance and Ohm's law, power and energy* • Understand the relationship between the entities by using a series circuit containing a battery, switch and resistive component and calculate using Ohm's law.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Students write tests to assess whether the important definitions, conventions, analogies, symbols, units of measurements and concepts used in fundamental electrical theory have been retained. • Demonstrations are used to prove theoretical statements. • Students conduct practical experiments and compare the results with theoretical statements.	

SUBJECT OUTCOME	
Do calculations using Ohm's law, the power and energy formulae and Joule's law.	
ASSESSMENT STANDARD	**LEARNING OUTCOMES**
• The relationship between electric entities is used in calculations.	• State the definitions and formulae for energy and power verbally and in writing. • Identify the correct formula to be used in practical examples. • Calculate the answers and insert correct unit of measurement.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Students recall definitions and formulae and calculate voltage, current, resistance, power and energy. (Convert to standard units of measurement.)	

SUBJECT OUTCOME	
Explain the factors influencing the electrical resistance of materials and do calculations.	
ASSESSMENT STANDARDS	**LEARNING OUTCOMES**
• The theory behind the electrical resistance of materials is understood and applied practically. • The electrical resistance of material is calculated.	• Identify conductor shape, size and length from practical examples. • State types of material commonly used in manufacturing conductors verbally and in writing. • State influence of conductor type, length, cross-sectional area and temperature on resistance verbally and in writing.

	• Do calculations to determine resistance. *Range:* $R = \frac{\rho l}{A}$ *and* $R_T = R_0(1+\alpha\Delta T)$
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Students write tests to assess iwhether nformation and concepts have been retained. • Students identify samples of conductors. • Students conduct practical experiments and compare the results with theoretical calculations. • Calculations are performed to calculate resistance.	

SUBJECT OUTCOME	
Distinguish between DC, AC, single phase and three-phase AC supply systems, highlighting the advantages and disadvantages of the different systems.	
ASSESSMENT STANDARD	**LEARNING OUTCOMES**
• The theory behind electrical supply systems is understood and applied practically.	• Sketch sine wave voltage waveforms with different amplitudes and frequencies. • Show phase angle displacement in three-phase supplies. • Discuss the supply systems found in South Africa and list the advantages and disadvantages of the systems. *Range: Direct current (DC) and alternating current (AC) supplies*
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Test for understanding of concepts such as DC, AC, single phase and three-phase AC supplies, amplitude, frequency, phase angle, two-wire, three-wire and four-wire supply systems	

SUBJECT OUTCOME	
Explain the theory of magnetism and electromagnetism (magnetic poles, magnetic fields and field lines, flux, flux density, magnetic field around a current-carrying conductor and the solenoid, m.m.f., magnetic field strength and force on a current-carrying conductor).	
ASSESSMENT STANDARD	**LEARNING OUTCOMES**
• The theory of magnetism and electromagnetism that has relevance to the electric field of study is understood.	• Recall definitions verbally and in writing. • State requirements for sketching magnetic field lines verbally and in writing. • Sketch magnetic field lines around bar and horseshoe magnets using the rules above. • Apply the right-hand grip or screw rule and Fleming's left-hand rule to determine the magnetic field around a current-carrying conductor and the solenoid.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Test for understanding of concepts such as magnetic poles, magnetic field strength, magnetic fields and field lines, flux, flux density, m.m.f., etc. • Students indicate the direction of the force on a current-carrying conductor inside a magnetic field.	

Topic 2: DC and AC Circuits

SUBJECT OUTCOME	
Do calculations for resistors in series, parallel and series-parallel.	
ASSESSMENT STANDARD	**LEARNING OUTCOMES**
• Connecting resistors in series, parallel and series-parallel and calculating currents, voltages and effective resistance is understood.	• Recall the formulae for combining resistors verbally and in writing. • Explain principles of operation of a combination of series and parallel resistors by predicting what the distribution of currents in all the branches and volt drops across resistors will be. • Sketch the circuit from the information supplied by using IEC symbols. • Calculate total resistance and currents in all the branches and volt drops across resistors.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Students write tests to assess whether information and concepts have been retained. • Students calculate resistance, current and voltage. • Students conduct practical experiments to verify calculations. • Students draw circuit diagrams using standard symbols and drawing practices.	

SUBJECT OUTCOME	
Explain continuity and current flow.	
ASSESSMENT STANDARD	**LEARNING OUTCOMES**
• Continuity is explained and circuits are analysed for current flow.	• Identify closed and open circuits from examples. • Predict whether current flow is possible.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Students analyse practical circuits and identify closed and open circuits and paths where there is or is not current flow.	

SUBJECT OUTCOME	
Use look-up tables to select wire and cable sizes.	
ASSESSMENT STANDARD	**LEARNING OUTCOMES**
• Rating and selection of wiring and cabling is understood.	• List requirements from examples. • Use look-up tables correctly.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Students calculate maximum current in the wire or cable and use look-up tables correctly.	

SUBJECT OUTCOME	
Do calculations with respect to grouping of cells (series, parallel and series-parallel), taking into account cell resistance.	
ASSESSMENT STANDARDS	**LEARNING OUTCOMES**
• The resultant e.m.f and possible current delivery when connecting electrolytic cells together is understood. • Calculations are done on typical circuits involving the grouping of cells.	• Understand internal resistance and reasons for grouping of cells. • Do calculations using practical examples.

ASSESSMENT TASKS OR ACTIVITIES
Assessment tasks or activities include but are not limited to: • Students write tests to assess whether information and concepts have been retained. • Students calculate resistance, current and voltage. • Students conduct practical experiments to verify calculations. • Students draw circuit diagrams using standard symbols and drawing practices.

Learning Outcomes

SUBJECT OUTCOME	
Do calculations to implement load balancing in a three-phase supplied system.	
ASSESSMENT STANDARDS	**LEARNING OUTCOMES**
• The theory behind load balancing is understood. • Basic load balancing calculations are done for typical examples.	• Correctly list information from a typical scenario. • Calculate loads per phase using the information given, assuming all appliances are used simultaneously. • Sketch results to show how the loads must be connected.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Test for understanding of terminology such as loading per phase, circuit wiring limitations, single and three phase appliances, etc. • Students calculate loading per phase and sketch the resulting circuit diagram.	

SUBJECT OUTCOME	
Explain how transformers are constructed and their operating principle and do basic turns-ratio calculations.	
ASSESSMENT STANDARDS	**LEARNING OUTCOMES**
• The theory behind transformer construction is understood. • Basic ideal transformer calculations are done for typical examples.	• Describe the construction of transformers in terms of windings, core, connections and cooling with the aid of sketches and explanations. • State the operating principle of transformers verbally and in writing. • Use the ideal transformer equation to do calculations.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Test for understanding of terminology such as turns-ratio, step-up and step-down transformers, air and oil cooling, etc. • Students calculate primary and secondary current and voltage.	

Topic 3: Protection and Measuring and Testing Instruments

SUBJECT OUTCOME	
Discuss the theory behind and the importance of earthing of electrical appliances, installations and distribution systems.	
ASSESSMENT STANDARDS	**LEARNING OUTCOMES**
• The reasoning behind earthing is understood. • Typical earthing methods are demonstrated with examples.	• Explain why earthing is necessary. • State which devices and systems require earthing according to the SABS Code of Practice (SANS 10142).
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Students explain how earthing of electrical appliances, installations and distribution systems is achieved in practice. • Task: Students research the SABS Code of Practice 0142 for earthing requirements (SANS 10142).	

SUBJECT OUTCOME	
Show how measuring and testing instruments are used in practice. *Range: Ammeters, voltmeters, frequency meters, ohmmeters, Meggers, wattmeters, tong-testers and continuity testers*	
ASSESSMENT STANDARD	**LEARNING OUTCOMES**
• Basic theory and design of measuring instruments is understood.	• State why measuring instruments are important and show how to take proper care of them. • Sketch and explain the basic design of an insulation resistance tester and the principle of operation. • Indicate how instrument transformers are used to lower the voltage and current for the instrument. • Sketch and explain how measuring instruments are inserted in circuits. • State how the range of a voltmeter and ammeter can be increased.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Test students on Learning Outcomes.	

SUBJECT OUTCOME	
Use and care for hand-held electrical test instruments (tong-tester, ammeter, voltmeter, multimeter and Megger).	
ASSESSMENT STANDARD	**LEARNING OUTCOMES**
• Practical applications for various electrical measuring instruments are done to familiarise students with instrument use.	• Set the instrument for use in a practical scenario. • Select and read scaled readings off analogue and digital instruments in a practical scenario. • Insert instruments correctly into circuits in a practical scenario. • State how to care for the instrument. • Correctly store the instrument.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Practical: Student must correctly: ▪ Insert ammeters, voltmeters, frequency meters, ohmmeters, Meggers and wattmeters into circuits. ▪ Couple current transformers and potential transformers to increase the range of the instruments. ▪ Read the value off the instruments. ▪ Correctly multiply the scale factor of the displayed value to attain the actual value.	

Topic 4: Circuit Diagrams, Drawings and Cabling

SUBJECT OUTCOME	
Explain methods to join electric cords, conductors and electric cables. *Range: Low voltage applications only*	
ASSESSMENT STANDARD	**LEARNING OUTCOMES**
• The joining of electric conductors is understood.	• Explain the types of joining and soldering of multi-strand insulated conductors. • State where terminal blocks and screw-its for joining may be used in practice. • State where joining kits may be used to join cables. • State advantages and disadvantages of the different joining methods.

ASSESSMENT TASKS OR ACTIVITIES
Assessment tasks or activities include but are not limited to: • Students join electric cords, conductors and electric cables using appropriate methods.

SUBJECT OUTCOME	
Explain the purpose and design of wire ways.	
ASSESSMENT STANDARD	**LEARNING OUTCOMES**
• The purpose of wire ways is understood.	• State the definition and purpose of wire ways. • Identify wire ways in buildings and factories.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Test students on Learning Outcomes.	

SUBJECT OUTCOME	
Identify common drawing symbols and abbreviations used in electrical drawings. *Range: Wiring diagrams of electrical installations, motors and generators, transformer circuits and relay circuits*	
ASSESSMENT STANDARDS	**LEARNING OUTCOMES**
• Concepts of basic engineering drawings are understood. • Basic engineering drawings are interpreted. • Basic engineering drawings are produced.	• Discuss and explain basic engineering drawing concepts and material lists verbally and in writing. • Interpret basic engineering drawings verbally and in writing. • Produce drawing using IEC symbols and standard formats.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Test students on Learning Outcomes. Note: Students will not produce circuit diagrams that fall outside the scope of their knowledge. Students will produce basic wiring diagrams of series, parallel and series-parallel resistors and cells but they must be able to identify symbols for motors, generators, transformers, relays and relay contacts in complex drawings.	

SUBJECT OUTCOME	
Draw circuit diagrams of electrical sub-circuits. *Range: A luminaire circuit supplied from one circuit breaker, two or more luminaires supplied from one circuit breaker, two or more socket outlets supplied from one circuit breaker, a geyser circuit including isolator and ripple relay, a stove circuit including isolator (both single and three-phase connection)*	
ASSESSMENT STANDARDS	**LEARNING OUTCOMES**
• Concepts of basic circuit diagrams are understood. • Basic circuit diagrams are interpreted. • Basic circuit diagrams are produced. • Parts lists are compiled from basic circuit diagrams.	• Understand the requirements of a typical circuit. • Draw circuit diagrams that conform to standard practice (international standards). • Compile a parts list from the circuit diagram that includes component ratings.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Test if the students correctly connect typical electrical sub-circuits: ▪ Supply live and neutral ▪ Earth, if required ▪ Switch to isolate live wire	

- Parallel connections
- Stove isolator disconnects both live and neutral, etc.

- Students name and rate components:
  - Maximum permissible current rating, if applicable
  - Operating voltage rating, if applicable
  - Power rating, if applicable

Topic 5: Materials and Components

SUBJECT OUTCOME	
Identify the most commonly used electrical materials and electrical components. *Range: Materials such as copper, steel, glass, porcelain, mica, plastics, bakelite, carbon, oil-impregnated paper, rubber, lead, aluminium and tin* *Components such as insulated cables, stranded conductors, flexible cables, steel-cored cables, armoured cables, conduiting and associated fittings, clamps, cleats and saddles, porcelain, glass and mica insulators, busbars, fuses, heating elements, switches, circuit breakers, protection devices, luminaires, capacitors and transformers*	
ASSESSMENT STANDARDS	**LEARNING OUTCOMES**
• A wide range of materials used in the electrical field is familiar to students. • A wide range of components used in the electrical field is familiar to students.	• List types of material and their properties. • State which materials are conductors of electricity and which are commonly used for insulator material. • Identify types of material by analysing the application. • Illustrate with sketches the most commonly used cables, cords, conductors and insulators and where they are commonly used in the electrical field. • Explain flexible connections. • Identify meter boxes and distribution boxes and components found inside these boxes. • Identify electric earthing equipment.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Test students on Learning Outcomes. • Physical examples: Students must handle most commonly used electrical materials and electrical components. • Sketches of cables should be limited to steel-cored stranded aluminium and PVC wire armoured and paper-insulated, armoured cables. • Sketches of insulators should be limited to pin, strain and suspension type.	

SUBJECT OUTCOME	
Describe the operating principles of the most commonly used electrical components.	
ASSESSMENT STANDARD	**LEARNING OUTCOMES**
• The operating principles of the most commonly used electrical components are understood.	• Describe the operating principle of circuit breakers, isolators, lightning arrestors and earth leakage relays. • Sketch and explain the operating principle of geysers, stoves, thermostats, simmerstats, prepaid meters, energy control units (ripple relay and radio controlled), incandescent and fluorescent lamp and light dimmers. • Identify DC sources (Leclanché dry cell, mercury or silver-oxide cells, rechargeable Ni-Cd or metal hydride cells, lead-acid cells). • Sketch and explain the operating principle of lead-acid batteries and how to use and maintain them. • Identify where components are used by giving a practical application of each component.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Test students on Learning Outcomes. • Physical examples: Students must handle the most commonly used electrical components.	

SUBJECT OUTCOME	
Identify materials and components used in the distribution of electricity. *Range: Overhead lines (max. 11000V), poles, struts, ties, pin, strain and suspension insulators, steel-cored conductors, lightning arrestors, transformers, fuses and switchgear (include special erection tools such as the draw-vice)*	
ASSESSMENT STANDARD	**LEARNING OUTCOMES**
• A wide range of materials used in the distribution of electricity is familiar to students.	• List and identify components used in the distribution of electricity. • State types of material that components in the distribution of electricity are made of. • Sketch typical erection layouts to illustrate how cable tension is maintained in overhead lines. • Identify enclosures and mountings for components such as transformers and switchgear.
ASSESSMENT TASKS OR ACTIVITIES	
Assessment tasks or activities include but are not limited to: • Test students on Learning Outcomes. • Physical examples: Students must handle the most commonly used materials and components used in the distribution of electricity.	

4 SPECIFICATION FOR EXTERNAL ASSESSMENT IN ELECTRICAL PRINCIPLES AND PRACTICE – 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
	50-60%	30-40%	0-10%