basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

QUALITATIVE ANALYSIS OF LEARNER RESPONSES
AND
EVALUATION OF THE QUESTION PAPERS (PER PAPER)
NATIONAL SENIOR CERTIFICATE 2025
WESTERN CAPE EDUCATION DEPARTMENT

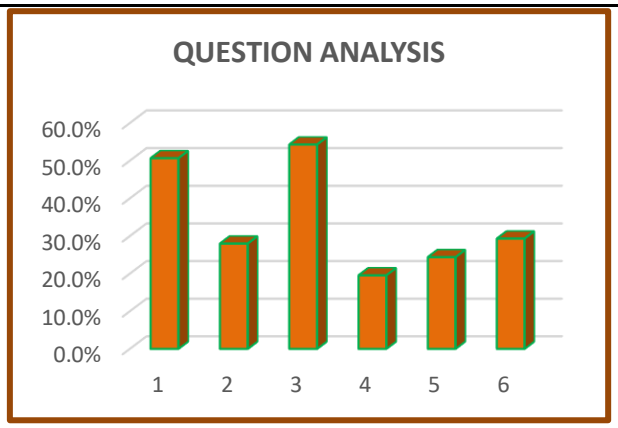
SUBJECT	**ELECTRICAL TECHNOLOGY (ELECTRONICS)**		
QUESTION PAPER	**1**	**2**	**3**
DURATION OF PAPER	**3 HOURS**		
INTERNAL MODERATOR	**WEN JOSEPH**		
CHIEF MARKER	**G CONRADIE**		
DATES OF MARKING	**FROM: 29 NOVEMBER 2025**	**TO: 10 DECEMBER 2025**	
HEAD OF EXAMINATION	**MS LM BREDENKAMP**		

REPORT 2: QUALITATIVE ANALYSIS OF LEARNER RESPONSES

SECTION 1: ***(GENERAL OVERVIEW OF LEARNER PERFORMANCE IN THE QUESTION PAPER AS A WHOLE)***

Analysis of the performance of the full complement of ten learners shows the following statistical indicators:

QUESTION NUMBER	1	2	3	4	5	6	
TOTAL	15	10	35	45	50	45	200
SUM	76	28	190	88	122	132	636
AVERAGE %	50.7%	28.0%	54.3%	19.6%	24.4%	29.3%	31,8%
AVERAGE MARK	7.6	2.8	19.0	8.8	12.2	13.2	63.6
RANGE	9	8	23	32	37	32	140
RANGE %	60.0%	80.0%	65.7%	71.1%	74.0%	71.1%	70.0%
MEDIAN	8	3	20.5	6.5	7.5	13	53.5
MEDIAN %	53.3%	30.0%	58.6%	14.4%	15.0%	28.9%	26.8%
STANDARD DEVIATION	2.4	2.2	9.2	9.2	11.9	9.0	39.6



Code	Range	Number
7	≥90%	0
7	80% - 89%	0
6	70% - 79%	1
5	60% - 69%	0
4	50% - 59%	0
3	40% - 49%	2
2	30% - 39%	2
1	20% - 29%	3
1	0% - 19%	2
	TOTAL	**10**

Overall learner performance in the 2025 Electronics examination was **weak**, with most candidates achieving **low totals** and showing significant difficulty in the higher-order sections of the paper. The uploaded marks reveal that while learners generally managed the **low-order and calculation-based questions**, they struggled substantially with questions requiring **conceptual understanding, diagram interpretation, waveform analysis, and multi-step reasoning**.

Performance across candidates shows a **consistent pattern**:

1. Stronger performance in lower-order questions

Learners performed comparatively better in:

- basic definitions,
- routine RLC calculations,
- straightforward recall items.

These sections show moderate averages and fewer zero-mark responses.

2. Very weak performance in higher-order questions (Q4–Q6)

The majority of learners scored extremely low in:

- semiconductor device characteristics (Q4),
- 555 timer and switching circuits (Q5),
- amplifiers and oscillators (Q6).

Many scripts record marks such as **0, 1, 2, or 3** out of large totals in these sections, and several candidates left entire subsections unanswered. This indicates major challenges with diagram-based tasks, waveform interpretation, and conceptual explanations.

3. Overall low totals and wide variation in performance

The uploaded data shows:

- numerous learners scoring below **40%**,
- only a small number approaching **60%**,
- a **large standard deviation**, reflecting inconsistent mastery of the curriculum.

This suggests that while a few learners managed to work through the paper, the majority did not demonstrate adequate understanding of key Grade 12 Electronics content.

4. Evidence of under-preparation for advanced topics

The sharp decline in marks in high-order items indicates that learners were not adequately prepared for the analytical and application-based demands of the paper. This is consistent with the identified challenge of **limited educator expertise**, which affected depth of teaching and exposure to higher-order problem-solving.

Overall Conclusion

Learner performance was **considerably below the expected Grade 12 standard**, particularly in complex sections requiring conceptual reasoning and interpretation of visual information. The pattern of results shows that while foundational knowledge was present, learners lacked the deeper understanding required to perform well in the application-heavy questions that dominate the latter half of the paper.

SECTION 2: ***COMMENT ON CANDIDATES' PERFORMANCE IN INDIVIDUAL QUESTIONS***

(It is expected that a comment will be provided for each question)

QUESTION 1
(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?
Learner performance in this question was **mixed to weak**. While some candidates managed the basic recall items, many struggled with items requiring careful reading or conceptual understanding. Overall, the question was **poorly answered** relative to expectations for Grade 12.
(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.
The question was poorly answered because learners lacked foundational understanding of key Electronics concepts and relied heavily on guesswork. Common errors included: • Confusing semiconductor devices (e.g., MOSFET vs JFET characteristics). • Misinterpreting terminology such as "resonance," "trigger," or "impedance." • Selecting distractor options that appeared familiar but were conceptually incorrect. Misconceptions included thinking that: • "Gate current flows in a MOSFET," • "Reactance decreases at resonance,"

- "555 timer pins operate independently of thresholds."

These errors indicate shallow content knowledge and insufficient exam practice.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

 Reinforce core definitions and principles through short, repeated quizzes.

 Teach learners how to analyse and eliminate incorrect options in multiple-choice items.

 Provide more exposure to semiconductor characteristics, RLC behaviour, and timer fundamentals.

 Integrate visual aids (graphs, diagrams, animations) to deepen conceptual understanding.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

 Many learners appear unfamiliar with basic terminology, suggesting that foundational content was not taught with sufficient depth.

 Teachers should focus on building conceptual understanding rather than rote memorisation.

 Subject advisors may need to provide additional support in teaching high-order topics such as semiconductors, switching circuits, and amplifiers.

 Professional development should prioritise strengthening teachers' content knowledge in Electronics to prevent persistent misconceptions.

QUESTION 2

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

Learner performance in Question 2 was **generally weak**. Many candidates struggled with the OHS definitions and explanations, indicating limited familiarity with the required terminology and legal concepts.

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

The question was poorly answered because learners lacked exposure to the **formal legal language** required for OHS.

Common errors included:

- Giving general safety statements instead of legal definitions.
- Confusing terms such as *critical incident*, *accident*, and *dangerous practice*.
- Providing incomplete or vague responses (e.g., "Machinery is equipment used in a workshop").
- Misunderstanding the difference between *unsafe acts* and *unsafe conditions*.

Misconceptions:

- Believing *any* equipment is "machinery," even without energy conversion.
- Thinking a "critical incident" simply means "something serious," rather than meeting OHS criteria.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

- Teach OHSA terms using simple, accurate explanations before introducing formal definitions.
- Use real workshop examples to help learners link terms to practice.
- Provide short-answer drills focusing on key distinctions (accident vs incident, PPE uses, etc.).
- Encourage learners to memorise essential OHSA wording as required by exams.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Many learners appear unfamiliar with the phrasing used in legislation, suggesting inconsistent teaching approaches.
- Teachers need support in breaking down OHS terminology into learner-friendly language.
- Subject advisors may consider developing standardised OHS notes to ensure uniformity across centres.
- Although OHS is theory-based, it must be taught with *clarity and precision*, as vague teaching leads to vague answers.

QUESTION 3

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

Learner performance in Question 3 was **moderate and generally better than in other sections**. Most candidates managed the routine AC calculations, although performance dropped on the phasor diagram and interpretation questions. Overall, the question was **fairly well answered**, with clear gaps in higher-order components.

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Poor performance occurred mainly in the conceptual and representational parts of the question. Common errors included:

- Incorrect calculation steps due to misuse of formulas (especially for impedance and phase angle).
- Failure to correctly apply signs when determining $X_L - X_C$.
- Incorrect or incomplete phasor diagrams (wrong orientation or missing labels).
- Misinterpreting resonance conditions and the effect of frequency changes.

Misconceptions:

- Believing resonance occurs when current is maximum, without understanding *why*.
- Thinking X_L and X_C both decrease with frequency.
- Confusing series and parallel resonance behaviours.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

- Provide structured practice in AC calculations with emphasis on formula selection and unit

handling.

- Use visual teaching tools (phasor animations, vector drawing practice) to clarify relationships.
- Reinforce conceptual understanding of resonance through simulations or practical demonstrations.
- Teach learners how frequency affects X_L and X_C with real-time graphs.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Learners appear confident with mechanical calculations but lack deep conceptual grounding.
- Teachers should emphasise *why* AC behaviours occur, not only *how* to calculate them.
- More exposure to phasor diagrams is needed, as many learners have limited practice drawing them.
- Advisors may consider running focused workshops on AC theory and graphical interpretation for both teachers and learners.

QUESTION 4

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

Learner performance in Question 4 was **poor**, with most candidates scoring very low. This section required strong understanding of semiconductor behaviour, characteristics, and circuit interpretation—areas where learners showed significant weakness. Overall, the question was **not well answered**.

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Learners performed poorly because they lacked the conceptual depth needed for semiconductor device theory and diagram interpretation.

Common errors included:

- Incorrect or missing JFET output characteristic curves.
- Confusion between MOSFET and JFET structure and operation.
- Incorrect completion of the UJT sawtooth generator circuit.
- Weak explanations of biasing effects (e.g., how VGS affects ID).
- Misidentifying op-amp pins or incorrectly drawing inverting amplifier connections.

Misconceptions observed:

- Thinking the MOSFET gate allows current flow.
- Believing JFET drain current increases indefinitely with VDS.
- Confusing emitter/base terminals in the UJT.
- Assuming all op-amp circuits behave the same regardless of configuration.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

- Reinforce fundamental semiconductor concepts using animations, simulations, and hands-on

demonstrations.

- Teach characteristic curves explicitly and provide repeated sketching practice.
- Break down complex circuits (UJT, op-amp configurations) into stages during instruction.
- Provide structured comparisons between JFET, MOSFET, and UJT operation to reduce confusion.
- Include regular diagram-drawing exercises to build visual interpretation skills.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Several learners left diagram-based questions blank, indicating lack of confidence and limited exposure.
- Teachers require stronger content knowledge in semiconductor physics to guide learners effectively.
- Subject advisors should prioritise teacher development workshops on FETs, UJTs, and op-amp applications.
- Greater emphasis is needed on linking theoretical concepts to real components and practical behaviour.

QUESTION 5

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

Learners performed **poorly** in Question 5. Most struggled with waveforms, trigger behaviour, and the operation of 555 timer circuits. This was one of the **lowest-scoring sections** of the paper.

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Common errors included:

- Incorrect monostable and bistable waveforms.
- Not understanding 1/3 VCC and 2/3 VCC threshold levels.
- Confusion between set/reset behaviour.
- Incorrect completion of op-amp monostable circuits.

Misconceptions:

- Believing the capacitor charges instantly.
- Thinking the output waveform mirrors the trigger pulse.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

- Teach timing diagrams step-by-step, using simulations to show real waveform behaviour.
- Reinforce the internal operation of the 555 (threshold, trigger, flip-flop).
- Provide repeated waveform sketching practice.
- Use colour-coded diagrams to show relationships between input, capacitor voltage, and output.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Many learners avoided waveform questions entirely.
- Teachers need support in teaching multivibrator operation and waveform interpretation.
- Clear, scaffolded examples in class would greatly improve performance.

QUESTION 6

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

Performance in Question 6 was **weak**. Learners struggled with amplifier concepts, load-line analysis, dB calculations, and oscillator theory—indicating insufficient depth of understanding.

(b) Why was the question answered poorly? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Common errors included:

- Incorrect identification of amplifier class from load-line diagrams.
- Misinterpreting distortion and saturation behaviour.
- Incorrect or incomplete dB gain calculations.
- Weak explanations of oscillator operation and frequency control.

Misconceptions:

- Believing an amplifier can output more power without additional supply energy.
- Confusing feedback with input signal control.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

- Use practical demonstrations or simulations to show amplifier behaviour.
- Teach load-line graphs gradually, highlighting Q-point movement.
- Reinforce the meaning and formula of dB gain.
- Provide structured notes on Hartley and RC phase-shift oscillators.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Learners lack exposure to real amplifier waveforms.
- Teachers require development in oscillator and amplifier instruction.
- High-order reasoning was especially weak in this section.