

MECHANICAL TECHNOLOGY

ASSESSMENT GUIDELINES



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Introduction & Policy Framework

The policy framework for setting question papers in Mechanical Technology refers to the official guidelines, principles, and assessment requirements that ensure examinations are fair, valid, reliable, and aligned to the curriculum. These policies guide educators, subject specialists, examiners, moderators, and assessment bodies when developing formal assessment tasks and examination papers.

The following policy documents and frameworks must be considered when setting Mechanical Technology papers:

1. Curriculum and Assessment Policy Statement (CAPS)

The Department of Basic Education CAPS document is the primary policy that prescribes:

- Content to be taught
- Topics and scope per term
- Cognitive levels
- Weighting of topics
- Assessment requirements
- Practical and theoretical components

Question papers must align directly with the CAPS content coverage and annual teaching plans for:

- Welding & Metalwork
- Fitting & Machining
- Automotive

CAPS ensures that:

- Questions are curriculum-based
- Content is grade-appropriate
- Difficulty levels are balanced
- Assessment standards are maintained nationally

2. National Protocol for Assessment (NPA)

The National Protocol for Assessment provides guidelines on:

- Formal assessment requirements
- SBA implementation
- Recording and reporting
- Examination procedures
- Promotion requirements

When setting papers, the NPA ensures:

- Standardisation of assessment practices
- Fairness and credibility
- Consistency across schools and provinces
- Proper weighting of cognitive levels

3. Examination Guidelines

Examination guidelines clarify:

- Frequently tested content
- Depth of questioning
- Interpretation of CAPS
- Suggested approaches to assessment

These guidelines assist examiners to:

- Set appropriate higher-order questions
- Integrate theory with practical application
- Use industry-related scenarios
- Maintain subject relevance

4. Assessment Principles

Mechanical Technology question papers must comply with key assessment principles:

Validity

Questions must assess the intended knowledge and skills prescribed in CAPS.

Reliability

The paper must produce consistent results across different learners and contexts.

Fairness

Questions must:

- Avoid ambiguity
- Be free from bias
- Be understandable to all learners

Practicality

The paper must be realistic regarding:

- Time allocation
- Mark allocation
- Learner ability level

Authenticity

Questions should reflect real workshop and industry situations.

5. Cognitive Levels and Bloom's Taxonomy

Question papers must include a balance of:

- Lower-order questions
- Middle-order questions
- Higher-order questions

Typical cognitive distribution in Mechanical Technology:

- Knowledge and recall
- Understanding and application
- Analysis, evaluation, and problem-solving

Higher-order questions should require learners to:

- Analyse faults
- Evaluate processes
- Justify procedures
- Recommend solutions
- Interpret workshop scenarios

6. Moderation Requirements

All question papers must undergo:

- Internal moderation
- Cluster moderation
- District/provincial moderation where applicable

Moderation checks:

- CAPS alignment
- Language clarity
- Correct memorandum
- Cognitive balance
- Technical accuracy
- Marking reliability

7. Language and Technical Accuracy

Mechanical Technology papers must:

- Use correct technical terminology
- Include accurate units and symbols
- Use clear diagrams where necessary
- Avoid vague or overly complex wording

Questions should reflect industry terminology and workshop practice.

8. Marking Guidelines and Memoranda

A memorandum must:

- Include accurate solutions
- Allocate marks consistently
- Allow for alternative correct responses where applicable
- Include rubrics for structured and drawing questions

This ensures standardised and fair marking.

9. Inclusive and Quality Assessment Practices

Question papers should:

- Cater for varying learner abilities
- Include different question types
- Encourage critical thinking
- Promote problem-solving and practical reasoning

Good papers integrate:

- Calculations
- Workshop scenarios
- Diagrams
- Case studies
- Interpretation questions

The policy framework for setting Mechanical Technology question papers ensures that assessment is fair, credible, standardised, and aligned with CAPS and national assessment policies. Proper adherence to these policies promotes quality assessment practices, accurate measurement of learner performance, and preparation for real industrial and technical environments.

GUIDELINES FOR SETTING QUALITY TESTS AND EXAMINATIONS

1. INTRODUCTION

Quality assessment is a critical component of effective teaching and learning. Tests and examinations should measure learner achievement accurately, fairly, reliably, and in alignment with curriculum policy requirements. Well-constructed assessments assist educators in determining learner understanding, identifying learning gaps, improving teaching strategies, and ensuring progression toward curriculum outcomes.

A quality test or examination:

- Aligns with CAPS requirements and Annual Teaching Plans (ATPs).
- Measures different cognitive levels appropriately.
- Uses clear, unambiguous language.
- Is fair, valid, and reliable.
- Provides learners with equal opportunity to demonstrate knowledge and skills.
- Includes a suitable balance between theory, application, and higher-order thinking.

2. PRINCIPLES OF QUALITY ASSESSMENT

Assessment is not merely the process of awarding marks; it is a structured educational activity that gathers evidence about learner understanding, practical competence, problem-solving ability, values, and application of knowledge. Quality assessment improves teaching effectiveness and ensures accountability in curriculum delivery.

A quality assessment system must support:

- Curriculum delivery and progression.
- Learner development and confidence.
- Accurate reporting to parents and stakeholders.
- Fair opportunities for all learners.
- Identification of barriers to learning.
- Improvement of classroom teaching practices.

The following principles are essential in all quality tests and examinations:

2.1 Validity

Validity refers to whether the assessment measures what it is intended to measure.

A valid assessment:

- Covers the prescribed content.
- Assesses stated learning outcomes.
- Uses questions appropriate to learner grade and cognitive level.
- Reflects classroom teaching and curriculum pacing.

Example:

If a Welding and Metalwork examination aims to assess welding safety procedures, questions must focus on safety knowledge and practical application rather than unrelated theory.

2.2 Reliability

Reliability refers to consistency in assessment results.

Reliable assessments:

- Produce consistent results over time.
- Include clearly structured marking guidelines.
- Avoid ambiguity.
- Ensure all learners interpret questions similarly.

To improve reliability:

- Use standard terminology.
- Provide detailed memoranda.
- Use moderated question papers.
- Ensure mark allocation matches expected responses.

2.3 Fairness

Fair assessments provide equal opportunity for all learners.

A fair assessment:

- Uses language suitable to learner level.
- Avoids bias and discrimination.
- Accommodates diverse learner abilities.
- Provides balanced cognitive demand.
- Reflects taught content only.

2.4 Practicality

Assessment must be manageable and realistic.

Practical assessments:

- Fit within allocated time.
- Have achievable mark allocations.
- Are easy to administer.
- Have clear instructions.
- Use accessible resources.

3. STEPS IN SETTING QUALITY TESTS AND EXAMINATIONS

Step 1: Consult Policy Documents

The first and most important step in setting quality assessments is careful consultation of all official curriculum and assessment policy documents. Failure to align assessment with policy results in invalid assessment practices and poor moderation outcomes.

Educators must thoroughly study:

CAPS Document

The Curriculum and Assessment Policy Statement (CAPS) provides:

- Content to be taught.
- Scope and depth of topics.
- Weighting of content areas.
- Prescribed practical work.
- Cognitive level requirements.
- Formal assessment requirements.

Annual Teaching Plan (ATP)

The ATP ensures:

- Correct pacing.
- Appropriate term coverage.
- Alignment with teaching schedule.
- Fair assessment timing.

Examination Guidelines

These provide:

- Examination structure.
- Standard question formats.
- Topic weighting.
- Expected cognitive demand.
- Examples of quality questions.

SBA and PAT Guidelines

These documents indicate:

- Formal assessment requirements.
- Evidence requirements.
- Practical assessment expectations.
- Moderation requirements.

PAM and Assessment Policies

These guide:

- Professional responsibilities.
- Recording and reporting.
- Quality assurance.
- Internal moderation.
- Examination administration.

Important considerations before setting a paper:

- Has all content been taught?
- Is the assessment aligned with term work?
- Are cognitive levels balanced?
- Are practical and theory components integrated appropriately?
- Is the examination suitable for learner developmental level?
- Does the paper comply with prescribed mark and time allocations?

Educators should avoid setting questions based only on textbooks or previous papers without verifying policy compliance.

Before setting an assessment, educators must consult:

- CAPS document
- Annual Teaching Plan (ATP)
- Subject Assessment Guidelines
- Examination Guidelines
- SBA requirements
- Circulars and departmental directives

Important considerations:

- Prescribed topics
- Weighting of topics
- Cognitive level distribution
- Examination format
- Time allocation
- Mark allocation

Step 2: Determine Purpose of Assessment

The educator must determine why the assessment is being conducted.

Types of assessment purposes:

Purpose	Description
Diagnostic	Identifies learner strengths and weaknesses
Formative	Supports learning during instruction
Summative	Measures achievement at end of term/year
Informal	Daily classroom assessment
Formal	Recorded SBA tasks and examinations

Step 3: Develop an Assessment Plan

A proper assessment plan acts as the blueprint for the examination. It prevents over-assessment of some topics and under-assessment of others.

The assessment plan should include:

- Topics to be assessed.
- Weighting of each topic.
- Cognitive levels.
- Question types.
- Difficulty levels.
- Time allocation.
- Mark allocation.
- Resources required.

Importance of planning

Without proper planning:

- Papers become unbalanced.
- Some topics are over-emphasised.
- Time allocation becomes unrealistic.
- Cognitive weighting becomes non-compliant.
- Moderation findings increase.

Example of planning process:

1. Identify topics completed during the term.
2. Determine topic weighting according to CAPS.
3. Allocate cognitive levels.
4. Decide on suitable question types.
5. Estimate learner completion time.
6. Draft assessment grid.
7. Draft memorandum simultaneously.

Best Practice

Experienced examiners develop the memorandum while setting the paper. This helps ensure:

- Fair mark allocation.
- Realistic answers.
- Technical accuracy.
- Appropriate cognitive demand.

An assessment plan ensures balanced coverage.

The plan should include:

- Topics to be assessed
- Marks per topic
- Cognitive levels
- Question types
- Time allocation
- Difficulty level

Step 4: Compile a Table of Specifications (Assessment Grid)

A table of specifications ensures balanced coverage of content and cognitive levels.

Example of an Assessment Grid

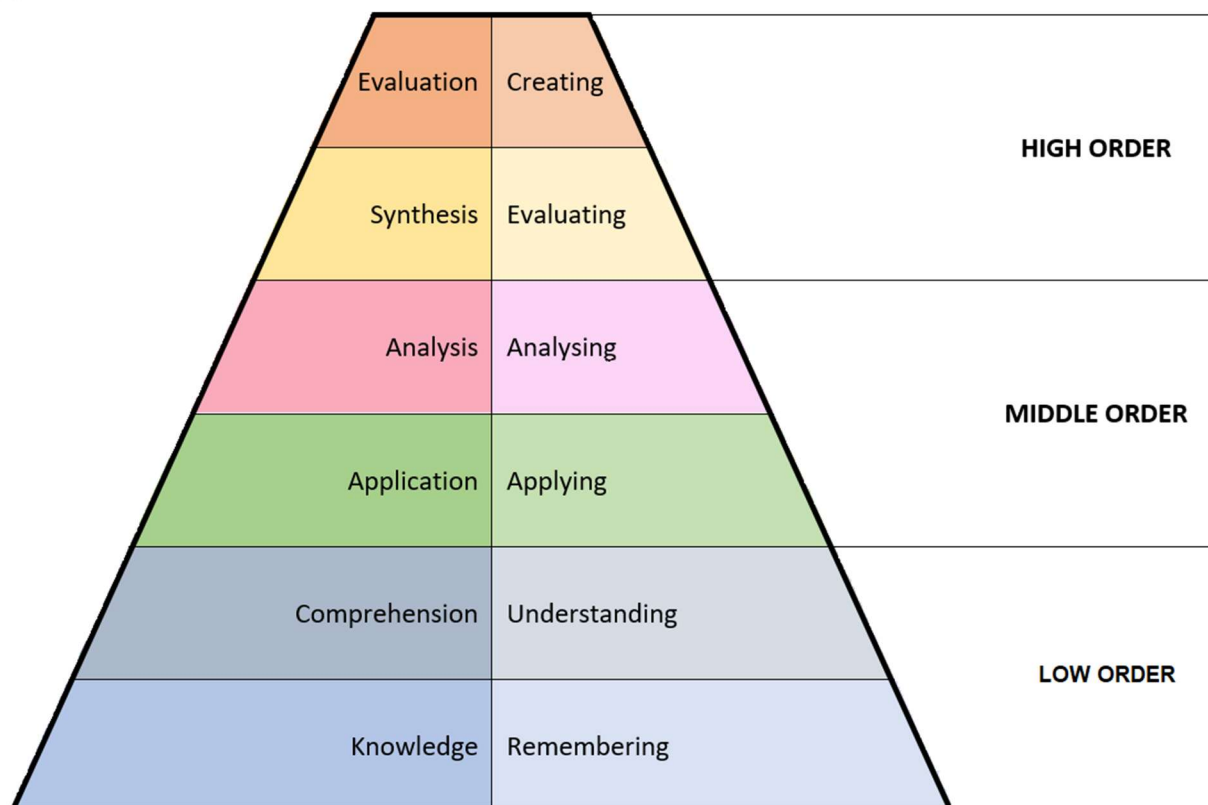
Topic	Knowledge	Understanding	Application	Analysis/Evaluation	Total
Safety	5	5	5	0	15
Tools & Equipment	4	6	5	0	15
Welding Processes	5	10	10	5	30
Calculations	2	4	8	6	20
Drawings/Sketches	2	4	8	6	20
Total	18	29	36	17	100

4. COGNITIVE LEVELS IN ASSESSMENT

Assessment should include a balance of lower, middle, and higher-order thinking skills.

Bloom's Taxonomy Levels

Blooms Taxonomy consists of six levels as shown below.



Bloom's Taxonomy	Bloom's Revised Taxonomy	Description
Evaluation	Creating	Design, assemble, generating, planning, producing, construct, conjecture, develop, formulate, author, investigate.
Synthesis	Evaluating	Critiquing, judging, justifying, recommending, appraise, argue, defend, select, support, value, weigh.
Analysis	Analysing	Differentiate, organising, attributing, relate, compare, contrast, distinguish, examine, experiment, question, test.
Application	Applying	Execute, implement, preparing, using, solve, demonstrate, interpret, operate, schedule, sketch.
Comprehension	Understanding	Interpreting, exemplifying, classifying, describe, identify, summarising, inferring, comparing, explain, locate, recognize, report, select, translate.
Knowledge	Remembering	Recognising, recalling, labelling, naming, define, duplicate, list, repeat, state

Cognitive Distribution

The following cognitive levels and weighting thereof are applicable to the Mechanical Technology specialisations:

Cognitive Levels		Weighting
Lower order	Knowledge/Remembering: memorise and recall information.	30%
	Comprehension/Understanding: (understanding) interpret information in one's own words: describe, indicate, restate, review, summarise, classify.	
Medium order	Application/Applying: apply knowledge to new situations: apply, calculate, draw, explain, identify, illustrate, prepare, operate, practice, solve, sketch, uses.	50%
	Analysis/Analysing: break down knowledge into parts and show relationship among parts: analyses, categorise, compare, distinguish, discuss, examine, investigate, test.	
Higher order	Synthesis/Evaluating: bring together parts of knowledge to form a whole; build relationships for new situation: arrange, compose, formulate, organise, plan, assemble, construct, problem-solving	20%
	Evaluation/Creating: make judgements on basis of criteria: appraise, assess, comment, critically analyses, evaluate, conclude, interrogate, judge, predict, compare,	

Difficult Level per Cognitive Level Distribution

Difficulty Level	Percentage
Easy	30%
Medium	40%
Difficult	30%

Using Easy, Medium, and Difficult questions within each Bloom's Taxonomy level (L1–L6) is important because learners within the same cognitive level still demonstrate different depths of understanding and ability. Difficulty does not only depend on the Bloom's level itself, but also on factors such as the amount of information required, the complexity of the context, the number of thinking steps involved, and the degree of reasoning expected. For example, at Level 1 (Remember), an easy question such as listing two PPE items only requires simple recall of familiar facts, while a difficult Level 1 question asking learners to state four types of mechanical control systems requires broader content knowledge and greater memory recall. This shows that even within the same cognitive level, questions can vary in complexity and challenge.

At Levels 2 to 4 (Understand, Apply, and Analyse), the spread of difficulty ensures that learners gradually progress from basic interpretation to deeper reasoning and practical application. Easy questions help learners access the assessment and demonstrate basic comprehension or simple application skills. Medium questions require learners to explain concepts more fully, apply knowledge in realistic contexts, or compare and interpret information. Difficult questions at these levels require learners to connect multiple ideas, analyse causes and effects, follow procedures accurately, or interpret complex scenarios. For example, analysing a workshop accident is more difficult than simply identifying parts from a diagram because learners must reason, identify relationships, and link contributing factors logically.

At Levels 5 and 6 (Evaluate and Create), different difficulty levels are necessary because higher-order thinking can still vary in complexity. An easy evaluation question may only require a simple opinion with one reason, while a difficult evaluation question requires detailed judgement, evidence, and justification in a realistic workshop scenario. Similarly, creation tasks can range from constructing simple technical sentences to developing a complete maintenance schedule that involves planning, organisation, technical

understanding, and problem-solving. Including Easy, Medium, and Difficult questions across all Bloom's levels ensures fairness, accommodates learners with varying abilities, and allows assessment to accurately measure both foundational understanding and advanced cognitive skills. This balanced spread improves the validity and reliability of question papers and promotes progressive development of technical and critical thinking skills in Mechanical Technology.

Educators must comply with CAPS-prescribed cognitive weighting for their specific subject.

LEVEL 1: REMEMBER (Recall Facts)

Easy Safety

- List TWO personal protective equipment (PPE) used in a workshop.
👉 Simple recall

Medium Terminology

- Define the term "torque".
👉 Requires correct wording

Difficult Systems & Control

- State FOUR types of mechanical control systems.
👉 More recall + broader content

LEVEL 2: UNDERSTAND (Explain Meaning)

Easy Safety

- Explain why safety goggles are important.

Medium Maintenance

- Describe the purpose of preventive maintenance.

Difficult Systems & Control

- Explain how a feedback system works in a machine.
👉 Requires conceptual understanding

LEVEL 3: APPLY (Use Knowledge in Context)**Easy
Safety**

- Identify the correct PPE for welding from a given picture.

**Medium
Terminology**

- Use the term “friction” in a practical example.

**Difficult
Maintenance**

- Demonstrate how to lubricate a bearing correctly.
👉 Requires procedural understanding

LEVEL 4: ANALYSE (Break Down)**Easy
Systems & Control**

- Identify parts of a control system from a diagram.

**Medium
Maintenance**

- Compare preventive and corrective maintenance.

**Difficult
Safety**

- Analyse a workshop accident and identify the causes.
👉 Requires reasoning and linking factors

LEVEL 5: EVALUATE (Justify Decisions)**Easy
Maintenance**

- State whether maintenance is necessary and give a reason.

**Medium
Systems & Control**

- Decide which control system is better for a machine and justify.

**Difficult
Safety**

- Evaluate the effectiveness of safety procedures in a workshop scenario.
👉 Requires judgement + reasoning

LEVEL 6: CREATE (Design / Develop)**Easy****Terminology**

- Construct a sentence using five technical terms.

Medium**Systems & Control**

- Design a simple control system diagram.

Difficult**Maintenance**

- Develop a maintenance schedule for a workshop machine.
 👉 Highest level: synthesis and planning

Common Mistakes in Question Setting

Avoid:

- ❌ Too many L1 questions
- ❌ No higher-order questions
- ❌ Using “explain” but expecting recall
- ❌ Not aligning with CAPS weighting

Question Setting Grid Examples**L1: KNOWLEDGE (Recall)**

Challenge	Example
Low	List TWO safety rules in a workshop.
Medium	Name FOUR types of PPE used in welding.
High	List SIX safety precautions AND classify them into personal and machine safety.

L2: COMPREHENSION (Understand)

Challenge	Example
Low	Explain why PPE is important.
Medium	Describe how poor maintenance can cause accidents.
High	Explain the relationship between safety procedures and accident prevention in a workshop.

L3: APPLICATION (Use Knowledge)

Challenge	Example
Low	Identify correct PPE for grinding.
Medium	Apply safety rules to a given workshop scenario.
High	Demonstrate how to safely set up a machine before operation.

L4: ANALYSIS (Break Down)

Challenge	Example
Low	Identify components of a control system.
Medium	Compare open-loop and closed-loop systems.
High	Analyse a machine failure and determine the root cause.

L5: SYNTHESIS (Create)

Challenge	Example
Low	Construct a simple labelled diagram of a system.
Medium	Design a basic control system for a workshop machine.
High	Develop a full maintenance plan for workshop equipment.

L6: EVALUATION (Judge/Justify)

Challenge	Example
Low	State whether maintenance is important and give ONE reason.
Medium	Justify the use of preventive maintenance over corrective maintenance.
High	Evaluate the effectiveness of safety procedures in a real workshop scenario and recommend improvements.

5. CHARACTERISTICS OF QUALITY QUESTIONS

Questions are the core of any assessment. Poorly structured questions result in confusion, unreliable marks, and poor moderation outcomes. Quality questions accurately assess learner understanding and skills.

A quality question should:

- Be curriculum aligned.
- Be technically correct.
- Match learner developmental level.
- Use clear language.
- Assess intended outcomes.
- Be free from ambiguity.
- Reflect appropriate cognitive demand.
- Allow fair opportunity for learners to respond.

The quality of questioning directly affects the validity and reliability of the assessment.

Common causes of poor questioning

- **Copying questions without adaptation.**

Copying questions without adaptation refers to the practice of taking questions directly from textbooks, past examination papers, study guides, memoranda, or other sources without modifying them to suit the specific assessment context, learner ability, CAPS requirements, or current teaching content. These questions are often reproduced word-for-word without adjusting the cognitive level, mark allocation, terminology, diagrams, or context to align with the intended assessment objectives.

This practice is problematic because it can lead to poor quality assessment, repetition of outdated content, incorrect cognitive weighting, and questions that do not adequately assess learner understanding or practical application. In Mechanical Technology, adapted questions should reflect workshop realities, current classroom teaching, and appropriate Bloom's Taxonomy levels. Effective question setting requires educators to redesign or contextualise questions by changing scenarios, adjusting complexity, integrating practical situations, or improving wording so that the assessment becomes fair, valid, and suitable for the learners being assessed.

- **Overly complicated language.**

Overly complicated language confuses learners and may assess language ability instead of subject knowledge. Questions should be clear, direct, and appropriate to the learners' grade level.

Poor Example (Overly Complicated)

"Elucidate comprehensively on the procedural methodologies applicable during the operational implementation of oxy-acetylene cutting apparatuses."

Problems:

- Uses unnecessarily difficult vocabulary.
- Sentence structure is confusing.
- Learners may misunderstand the question.
- Tests English proficiency more than subject knowledge.

Improved Example

"Explain the procedure for using oxy-acetylene cutting equipment." (6)

Why this is better:

- Clear and direct.
- Uses appropriate technical language.
- Easier for learners to understand.
- Still assesses the intended knowledge.

Another Poor Example

“Substantiate the consequential implications associated with non-compliance regarding occupational health and safety stipulations.”

Improved Version

“Explain the consequences of not following workshop safety rules.” (4)

- **Poor Grammer**

Poor grammar creates ambiguity and confusion. Learners may interpret questions differently, resulting in unfair assessment.

Poor Example (Grammar Errors)

“Name three tools is used for measuring metal workpieces.” (3)

Problems:

- Incorrect sentence structure.
- Grammatical error (“is used”).
- Poor professionalism.

Improved Example

“Name THREE tools used for measuring metal workpieces.” (3)

Another Poor Example

“Explain why welding defects occur and how can it prevented.” (6)

Problems:

- Incorrect sentence structure.
- Missing word (“be”).
- Poor readability.

Improved Version

“Explain why welding defects occur and how they can be prevented.” (6)

Another Poor Example

“State what are the causes of porosity?” (4)

Improved Version

“State FOUR causes of porosity.” (4)

- **Unclear instructions.**

Unclear instructions refer to assessment questions or task directions that are vague, confusing, incomplete, or open to multiple interpretations, causing learners to misunderstand what is expected of them. This may include poorly worded questions, ambiguous verbs, missing information, unclear mark allocations, or instructions that do not specify the required response format. Learners may therefore know the content but still perform poorly because they are uncertain about what the question is asking.

In Mechanical Technology, unclear instructions can negatively affect the validity and fairness of assessment because learners may interpret technical tasks differently. For example, terms such as “discuss,” “explain,” “state,” “analyse,” or “evaluate” must be used correctly according to the intended cognitive level. Instructions should clearly indicate whether learners must list points, provide reasons, draw diagrams, perform calculations, or justify answers. Well-structured instructions help learners focus on demonstrating their knowledge and skills rather than trying to interpret confusing wording.

- **Unrealistic mark allocations.**

Mark allocation must match:

- Complexity of the question.
- Expected learner response.
- Time required to answer.

Unrealistic mark allocations result in unfair assessment and poor pacing.

Poor Example (Too Many Marks)

“Define welding.” (10)

Problems:

- Definition requires only a short answer.
- 10 marks is excessive.
- Over-rewards simple recall.

Improved Version

“Define welding.” (2)

Poor Example (Too Few Marks)

“Analyse the causes of weld distortion and recommend methods to prevent it.” (2)

Problems:

- Requires analysis and recommendations.
- Too few marks for expected depth.
- Does not reward higher-order thinking properly.

Improved Version

“Analyse the causes of weld distortion and recommend methods to prevent it.” (8)

Possible mark distribution:

- Causes explained = 4 marks
- Preventive methods = 4 marks

Another Poor Example

“Draw and label a welding symbol.” (1)

Problems:

- Drawing and labelling require multiple steps.
- One mark is insufficient.

Improved Version

“Draw and label a basic welding symbol.” (4)

Possible allocation:

- Correct drawing = 2 marks
- Correct labels = 2 marks

Guideline for Educators

Before finalising mark allocation, ask:

- How long will the learner need to answer?
- How complex is the response?
- Does the mark allocation reward the expected thinking level?
- Is the allocation fair and realistic?

General Rule of Thumb

For theory examinations:

Approximately 1 mark $\approx$ 1 minute

Although this may vary depending on:

- Subject
- Cognitive level
- Calculations
- Drawings
- Reading load

Higher-order questions usually require:

- More reading time
- More thinking time
- Longer written responses
- Higher mark allocations

- **Testing trivial information.**

Testing trivial information means assessing unimportant facts that do not meaningfully measure learner understanding, skills, application, or problem-solving ability. These questions usually focus on memorising insignificant details rather than important concepts or competencies required by CAPS.

Poor Example (Trivial Question)**Question:**

On which page of the textbook is the definition of arc welding found? (1)

Why this is poor:

- Tests memory of textbook layout rather than subject knowledge.
- Does not assess understanding or application.
- Has no educational value.
- Not aligned to curriculum outcomes.

Another Poor Example**Question:**

What colour was the welding machine shown in the classroom demonstration? (1)

Why this is trivial:

- The colour of the machine is irrelevant to welding competency.
- Does not assess technical knowledge or skill.
- Learners gain no meaningful educational benefit.

- **Improved Quality Questions**

Instead of testing trivial facts, questions should assess important knowledge and understanding.

Improved Example 1

Question:

Define arc welding. (2)

This assesses:

- Subject knowledge
- Technical terminology
- Understanding of core concepts

Improved Example 2

Question:

Explain TWO safety precautions that must be followed during arc welding. (4)

This assesses:

- Understanding
- Application of safety knowledge
- Real workplace competency

Improved Example 3 (Higher Order)

Question:

A weld shows excessive spatter and poor penetration. Analyse possible causes and recommend corrective actions. (6)

This assesses:

- Problem-solving
- Analysis
- Technical reasoning
- Application of knowledge

- **Repetition of questions.**

Repetition of questions refers to the unnecessary reuse of the same or very similar questions within a question paper, across different assessment tasks, or from previous examinations without sufficient variation. This may include repeating the

same concept, wording, diagram, or problem-solving approach multiple times, resulting in limited assessment coverage and reduced cognitive challenge.

In Mechanical Technology, repetition of questions is problematic because it prevents the assessment from adequately covering the full CAPS content and range of cognitive levels. It may also give learners an unfair advantage if they have memorised repeated questions rather than developed real understanding and practical problem-solving skills. Effective question papers should assess a variety of topics, skills, and thinking levels by using different contexts, scenarios, diagrams, and applications. This ensures broader content coverage, promotes critical thinking, and improves the validity and reliability of the assessment.

- **Assessing content not taught.**

Assessing content not taught refers to the inclusion of questions, concepts, skills, or calculations in an assessment that were not covered during teaching and learning, or that fall outside the prescribed CAPS curriculum and annual teaching plan. This occurs when learners are expected to answer questions on unfamiliar content that they have not been adequately prepared for in class.

In Mechanical Technology, assessing untaught content is unfair and negatively affects the validity and reliability of the assessment because learners are tested on knowledge and skills they did not have an opportunity to learn or practise. It may lead to poor learner performance, frustration, and inaccurate measurement of learner ability. Assessments should therefore align with CAPS requirements, the pacing of content coverage, and the level of teaching completed. Effective question setting ensures that all questions are based on content that has been properly taught, revised, and supported through classroom instruction and practical activities.

Educators should critically evaluate every question before finalising the paper.

5.1 Clear Instructions

Instructions must:

- Be concise and specific.
- State exactly what learners must do.
- Indicate marks clearly.
- Include numbering instructions.

Example:

“State THREE safety precautions when using an angle grinder. (3 × 1 = 3)”

5.2 Appropriate Language

Appropriate language refers to the use of clear, simple, accurate, and learner-friendly wording in assessment tasks and question papers to ensure that learners understand what is being asked. The language used should match the learners’ grade level, cognitive ability, and technical understanding while still maintaining correct subject terminology and academic standards.

In Mechanical Technology, appropriate language is important because complex, vague, or overly difficult wording can confuse learners and prevent them from demonstrating their actual knowledge and skills. Questions should use correct technical terms, clear instructions, and straightforward sentence structures without unnecessary jargon or complicated grammar. Appropriate language improves fairness, validity, and accessibility in assessment by ensuring that learners are assessed on their technical understanding rather than their ability to interpret confusing wording.

Questions must:

- Match learner language level.
- Avoid difficult vocabulary unless subject-specific.
- Avoid double negatives.
- Avoid ambiguous wording.

Poor Example:

“Which of the following is not uncommon?”

Improved Example:

“Which statement is correct?”

5.3 Appropriate Mark Allocation

Appropriate mark allocation refers to the fair and logical distribution of marks to questions or sub-questions based on the level of difficulty, the number of steps required, and the depth of knowledge or skill being assessed. Each mark should accurately reflect the amount of work, thinking, and application needed to answer a question correctly.

In Mechanical Technology, appropriate mark allocation ensures that simple recall questions carry fewer marks, while more complex tasks such as calculations, analysis, diagrams, or problem-solving carry higher marks. For example, listing PPE items may carry 1–2 marks, while explaining a system fault or performing a multi-step calculation may carry several marks. Correct mark allocation improves fairness, reliability, and transparency in assessment by ensuring that learners are rewarded according to the cognitive demand and complexity of each question.

Mark allocation must:

- Match complexity of response.
- Reflect expected time.
- Ensure fairness.

General guideline:

Approximately 1 mark = 1 minute for theory papers.

5.4 Variety of Question Types

Quality examinations include different question formats. Variety of questions refers to the inclusion of different question types, formats, contexts, and cognitive levels within an assessment. This includes multiple-choice, short response, structured questions, calculations, diagrams, problem-solving tasks, and scenario-based questions that assess different skills and levels of understanding.

The importance of variety in questions is that it ensures a more accurate and comprehensive assessment of learner knowledge and skills. In Mechanical Technology, learners must demonstrate not only theoretical understanding but also practical application, technical reasoning, and problem-solving ability. A variety of questions allows different cognitive levels (L1–L6) to be assessed fairly, catering for learners with different strengths and learning styles. It also prevents memorisation of answers, encourages critical thinking, and improves the validity and reliability of the assessment.

Furthermore, varied questioning reflects real-world workshop and industry situations where problems are not presented in a single format. By exposing learners to diagrams, calculations, explanations, and practical scenarios, assessments better prepare them for real technical environments. This ensures that learners develop a balanced set of skills, including analysis, evaluation, and creation, rather than relying only on rote learning.

Possible question types:

- Multiple choice
 - Fill-in/Complete sentences/paragraphs
 - True/False
 - Short questions
 - Structured questions
 - Paragraph questions
 - Calculations
 - Case studies
 - Drawings and interpretation
 - Problem-solving scenarios
-

6. SETTING QUALITY MULTIPLE-CHOICE QUESTIONS

Multiple-choice questions (MCQs) are commonly used in tests and examinations because they allow educators to assess a wide range of content in a relatively short period of time. When properly constructed, MCQs can assess not only recall of facts but also understanding, application, analysis, and problem-solving skills.

However, poorly designed MCQs often:

- Test trivial information.
- Encourage guessing.
- Confuse learners.
- Contain grammatical clues.
- Fail to assess higher-order thinking.

Quality MCQs require careful planning and construction.

6.1. PURPOSE OF MULTIPLE-CHOICE QUESTIONS

MCQs can be used to assess:

- Knowledge and recall
- Understanding of concepts
- Interpretation of diagrams
- Problem-solving
- Calculations
- Application of theory
- Technical understanding
- Safety procedures
- Decision-making

6.2. COMPONENTS OF A MULTIPLE-CHOICE QUESTION

A multiple-choice question consists of:

Component	Description
Stem	The main question or problem
Correct Answer	The only correct option
Distractors	Incorrect but plausible alternatives

Example Structure

Stem:

Which welding process uses a continuously fed wire electrode?

Options:

- A. TIG welding
- B. Spot welding
- C. MIG welding
- D. Gas welding

Correct Answer:

C. MIG welding

Distractors:

A, B, and D

6.3. CHARACTERISTICS OF QUALITY MULTIPLE-CHOICE QUESTIONS

Quality MCQs should:

- Have one clearly correct answer.
- Use clear and simple language.
- Avoid ambiguity.
- Use plausible distractors.
- Avoid clues to the answer.
- Match learner cognitive level.
- Be technically accurate.
- Assess meaningful knowledge.
- Align with CAPS requirements.

6.4. CHARACTERISTICS OF A GOOD STEM

The stem is the most important part of the question.

A good stem should:

- Present a clear problem.
- Include all necessary information.
- Avoid unnecessary wording.
- Be meaningful on its own.
- Use positive wording where possible.

Poor Example (Unclear Stem)

Which of the following is correct?

Problems:

- Learner does not know what is being asked.
- No context provided.

Improved Example

Which measuring instrument is used to measure external diameters accurately?

- A. Try square
- B. Outside micrometer
- C. Centre punch
- D. Steel rule

6.5. AVOID OVERLY COMPLICATED LANGUAGE

Poor Example

Which apparatus facilitates the quantification of circumferential dimensionality?

Problems:

- Difficult vocabulary.
- Confusing wording.
- Tests English rather than subject knowledge.

Improved Example

Which instrument measures the diameter of a round shaft?

- A. Vernier calliper
- B. Hammer
- C. Chisel
- D. Punch

6.6. USE PLAUSIBLE DISTRACTORS

Distractors must appear realistic to learners who do not know the answer.

Poor Example

Which gas is used in oxy-acetylene welding?

- A. Oxygen
- B. Acetylene
- C. Tomato sauce
- D. Water

Problems:

- C and D are obviously incorrect.
- Makes question too easy.

Improved Example

Which gas acts as the fuel gas in oxy-acetylene welding?

- A. Oxygen
- B. Nitrogen
- C. Acetylene
- D. Argon

Why this is better:

- All options appear possible.
- Learners must understand the concept.

Avoid The Following:

- **GRAMMATICAL CLUES**

The correct answer should not stand out because of grammar.

Poor Example

A welding defect is:

- A. Cracks
- B. Porosity
- C. Undercuts
- D. Burn throughs

Problem:

Only “Porosity” matches grammatically with the stem.

Improved Example

Which of the following is a welding defect?

- A. Porosity
- B. Measuring
- C. Grinding
- D. Marking out

- **USING “ALL OF THE ABOVE”**

Learners may guess the answer without understanding the content.

Poor Example

Which are workshop safety rules?

- A. Wear PPE
- B. Keep the floor clean
- C. Store tools correctly
- D. All of the above

Problem:

Learners can often guess correctly.

Improved Version

Which safety practice helps prevent workshop injuries?

- A. Wearing PPE
- B. Running in the workshop
- C. Leaving tools on the floor
- D. Ignoring warning signs

- **NEGATIVE WORDING**

Negative wording often confuses learners.

Poor Example

Which of the following is NOT unsafe?

Problems:

- Double negatives cause confusion.
- Learners may misread.

Improved Example

Which of the following is a safe workshop practice?

- A. Wearing loose clothing
- B. Operating machines without goggles
- C. Wearing safety boots
- D. Running near machines

- **TRICK QUESTIONS**

Assessment should test knowledge, not trap learners.

Poor Example

How many safety rules should not never be ignored?

Problems:

- Double negative.
- Confusing wording.
- Unfair assessment.

Improved Example

Why is it important to follow workshop safety rules?

- A. To reduce accidents
- B. To increase noise
- C. To waste materials
- D. To slow production

6.7. KEEP OPTIONS SIMILAR IN LENGTH

Longer options are often unintentionally correct.

Poor Example

Which welding process is best for thin sheet metal?

- A. Arc welding
- B. Gas welding
- C. TIG welding because it produces clean and accurate welds with excellent heat control
- D. Spot welding

Problem:

Option C stands out because it is much longer.

Improved Example

- A. Arc welding
- B. Gas welding
- C. TIG welding
- D. Spot welding

6.8. RANDOMISE CORRECT ANSWERS

Avoid patterns such as:

- Always “C”
- Alternating answers
- Mostly “B”

Learners may guess patterns.

Correct answers should be distributed randomly.

6.9. TEST HIGHER-ORDER THINKING

MCQs should not only test recall.

Lower-Order Example

What does PPE stand for?

- A. Personal Protective Equipment
- B. Protective Power Equipment
- C. Personal Power Engineering
- D. Public Protection Equipment

Higher-Order Example

A learner experiences excessive weld spatter during arc welding. Which adjustment is MOST likely to reduce the problem?

- A. Increase electrode angle excessively
- B. Reduce current to the correct setting
- C. Remove earth clamp
- D. Increase travel speed drastically

Why this is higher order:

- Requires application of knowledge.
- Uses a practical scenario.
- Assesses problem-solving.

6.10. USE DIAGRAMS AND VISUALS

Technical subjects benefit from visual MCQs.

Example

(Insert diagram of welding symbol)

Identify the welding symbol shown above.

- A. Fillet weld
- B. Spot weld
- C. Groove weld
- D. Plug weld

6.11. COGNITIVE LEVELS IN MCQs

MCQs can assess different cognitive levels.

Cognitive Level	Example
Remembering	Identify a tool
Understanding	Explain a concept
Applying	Select correct procedure
Analysing	Diagnose a fault
Evaluating	Choose best solution
Creating	Rarely used in MCQs

6.12. COMMON ERRORS IN MCQs

Error	Example
Ambiguous wording	Questions with multiple answers
Implausible distractors	Silly options
Grammatical clues	Correct answer fits stem
Unequal option length	Long correct answer
Negative wording	"Which is NOT..."
Trivial content	Testing page numbers
Multiple correct answers	Confuses learners

Quality Checklist For MCQS

Before finalising MCQs, verify:

Checklist Item	Yes/No
One correct answer only	
Distractors plausible	
Language clear	
No grammatical clues	
No trick wording	
CAPS aligned	
Appropriate cognitive level	
Technically correct	
Mark allocation correct	

Example Of A Well-Constructed MCQ

During arc welding, excessive current is MOST likely to cause:

- A. Poor penetration
- B. Electrode sticking
- C. Excessive spatter and undercutting
- D. Weak earth connection

Correct Answer:

C

Why this is quality:

- Technically accurate.
- Practical application.
- Plausible distractors.
- Clear wording.
- Tests understanding and application.

Recommendations For Educators

Educators should:

- Avoid copying questions directly from textbooks.
- Use moderation to improve quality.
- Include higher-order MCQs.
- Use realistic workplace scenarios.
- Ensure distractors are meaningful.
- Balance cognitive levels.
- Use clear technical language.
- Continuously analyse learner performance on MCQs.

Well-designed multiple-choice questions are valuable assessment tools that can effectively measure learner understanding, application, and problem-solving abilities. Quality MCQs require careful construction, technical accuracy, appropriate cognitive demand, and alignment with CAPS requirements.

Effective MCQs assess meaningful learning rather than memorisation of trivial facts, helping educators produce fair, reliable, and valid assessments that support learner achievement and curriculum delivery.

7. SETTING STRUCTURED QUESTIONS

Structured questions should:

- Progress from simple to complex.
- Include sub-questions logically.
- Cover different cognitive levels.
- Use real-life application where possible.

Structured questions are one of the most effective methods of assessment because they allow educators to assess a range of cognitive levels, from simple recall to higher-order thinking such as analysis, evaluation, and problem-solving.

Structured questions:

- Guide learners through a sequence of related questions.
- Allow gradual progression from simple to complex thinking.
- Assess deeper understanding.
- Encourage logical reasoning.
- Reduce random guessing.
- Allow learners to earn partial marks.

These questions are widely used in technical subjects because they effectively assess:

- Theory knowledge
- Technical understanding
- Practical application
- Calculations
- Interpretation
- Problem-solving
- Decision-making

What Is A Structured Question?

A structured question consists of:

- A main topic or scenario.
- A series of related sub-questions.
- Progressive cognitive demand.
- Clear mark allocation.

Example of a Structured Question

Topic: Arc Welding

- 1.1 Define arc welding. (2)
- 1.2 State TWO safety precautions during arc welding. (2)
- 1.3 Explain why excessive current causes welding defects. (4)
- 1.4 Recommend methods to reduce weld spatter. (4)

Purpose Of Structured Questions

Structured questions are designed to:

- Assess understanding progressively.
- Allow learners to build confidence.
- Assess multiple cognitive levels.
- Encourage logical thinking.
- Integrate theory and practice.
- Assess real-life application.

Characteristics Of Quality Structured Questions

Quality structured questions should:

- Align with CAPS requirements.
- Progress from easy to difficult.
- Use clear instructions.
- Include realistic technical scenarios.
- Assess meaningful learning.
- Include proper mark allocation.
- Cover different cognitive levels.
- Encourage application and reasoning.

Progression Of Cognitive Levels

Structured questions should move gradually from lower-order to higher-order thinking.

Example of Cognitive Progression

Question	Cognitive Level
Define welding	Remembering
Explain purpose of flux	Understanding
Calculate material length	Applying
Analyse causes of defects	Analysing
Recommend corrective actions	Evaluating

Start With Simple Questions

The first sub-question should usually:

- Build learner confidence.
- Introduce the topic.
- Assess basic knowledge.

Good Example**Topic: Safety**

1.1 Name TWO items of PPE used in welding. (2)

Why this works:

- Simple recall.
- Easy entry into question.
- Helps learners settle into assessment.

Progress To Understanding

After recall questions, move to explanation and understanding.

Example

1.2 Explain why welding gloves are important. (3)

This assesses:

- Understanding
- Technical reasoning
- Safety awareness

Include Application Questions

Application questions require learners to use knowledge in practical situations.

Example

1.3 A learner experiences electrode sticking during welding. Suggest TWO possible causes. (4)

Why this is effective:

- Uses real workshop problem.
- Requires application of theory.
- Assesses practical understanding.

Include Higher-Order Questions

Higher-order questions assess:

- Analysis
- Evaluation
- Problem-solving
- Decision-making

Example

1.4 A welded frame repeatedly cracks after cooling. Analyse possible causes and recommend corrective actions. (8)

This assesses:

- Problem-solving
- Technical reasoning
- Ability to evaluate solutions

Use Realistic Scenarios

Structured questions become more meaningful when linked to real workplace situations.

Poor Example

Explain welding defects.

Problem:

- Too broad.
- No context.
- Limited thinking required.

Improved Example

A workshop notices excessive porosity in welds on steel plates. Explain possible causes and recommend methods to prevent the defect. (6)

Why this is better:

- Realistic scenario.
- Requires application.
- Encourages analytical thinking.

Use Clear Instructions

Instructions must tell learners exactly what is expected.

Poor Example

Discuss welding.

Problems:

- Too vague.
- Learners unsure what to include.

Improved Example

Explain THREE advantages of MIG welding in manufacturing industries. (6)

Avoid Overly Complicated Language

Complex wording confuses learners.

Poor Example

Elucidate comprehensively on the operational ramifications associated with non-compliance of workshop safety regulations.

Problems:

- Difficult vocabulary.
- Tests language instead of subject knowledge.

Improved Example

Explain the consequences of not following workshop safety rules. (4)

Ensure Questions Match Mark Allocation

Marks must reflect:

- Complexity
- Length of expected response
- Cognitive level
- Time required

Poor Example

Define welding. (10)

Problem:

Simple definition cannot justify 10 marks.

Improved Example

Define welding. (2)

Another Poor Example

Analyse causes of weld distortion and recommend solutions. (2)

Problem:

Too few marks for complex thinking.

Improved Example

Analyse causes of weld distortion and recommend methods to reduce it. (8)

Use Command Verbs Correctly

Different verbs assess different cognitive levels.

Common Command Verbs

Verb	Meaning
Define	Give meaning
List	Provide names/items
Explain	Give reasons/details
Describe	Give characteristics
Compare	Show similarities/differences
Analyse	Break into parts
Evaluate	Judge or justify
Recommend	Suggest with reasons

Avoid Trivial Questions

Questions must assess meaningful learning.

Poor Example

What colour was the welding machine used in class? (1)

Problem:

Tests irrelevant information.

Improved Example

Explain the function of the welding machine earth clamp. (2)

Use Diagrams Where Appropriate

Technical subjects benefit from visual assessment.

Example

(Insert diagram of welding joint)

1.1 Identify the type of joint shown. (2)

1.2 State ONE advantage of this joint. (2)

1.3 Recommend a suitable welding process for this joint and justify your answer. (4)

Include Calculations

Structured questions may integrate calculations with theory.

Example

1.1 Calculate the material length required for a rectangular frame measuring 500 mm × 300 mm. (4)

1.2 Explain why accurate measurement is important during fabrication. (3)

Integrate Theory And Practical Knowledge

Quality structured questions combine:

- Technical theory
- Practical application
- Workplace understanding

Example

A learner produces weak welds during practical assessment.

1.1 State TWO possible causes. (2)

1.2 Explain how incorrect current settings affect weld quality. (4)

1.3 Recommend corrective actions. (4)

Common Errors In Structured Questions

Error	Example
Vague wording	"Discuss welding"
Poor grammar	Confusing sentence structure
Unrealistic marks	Complex question for 1 mark
No cognitive progression	All questions recall only
Ambiguous instructions	Multiple interpretations
Overly difficult language	Advanced vocabulary
Trivial information	Unimportant facts

Example Of A Well-Structured Question

Topic: Welding Safety

1.1 Define PPE. (2)

1.2 List THREE items of PPE used during welding. (3)

1.3 Explain why eye protection is important during arc welding. (4)

1.4 A learner removes safety gloves while welding thin metal. Analyse possible dangers associated with this action. (6)

Why this is effective:

- Clear progression.
- Multiple cognitive levels.
- Realistic context.
- Balanced mark allocation.
- Technical relevance.

Quality Checklist For Structured Questions

Before finalising, check:

Checklist Item	Yes/No
CAPS aligned	
Clear instructions	
Logical progression	
Appropriate cognitive levels	
Realistic mark allocation	
No ambiguity	
Technically correct	
Proper grammar	
Realistic scenarios included	

Recommendations For Educators

Educators should:

- Use real-life technical problems.
- Progress from simple to difficult questions.
- Include higher-order thinking.
- Use clear technical language.
- Avoid vague instructions.
- Align questions with CAPS.
- Moderate papers thoroughly.
- Include diagrams and practical application.
- Ensure fair mark allocation.

Structured questions are highly effective assessment tools because they allow educators to assess a wide range of knowledge, understanding, application, analysis, and problem-solving skills in a logical and progressive manner.

Well-constructed structured questions improve assessment validity, reliability, and fairness while promoting deeper learner understanding and meaningful engagement with technical subject content.

8. SETTING CALCULATION QUESTIONS IN MECHANICAL TECHNOLOGY

Calculation questions in Mechanical Technology are essential because they assess learners' ability to apply mathematical and scientific principles to engineering and workshop situations.

In Mechanical Technology, calculations are not merely mathematical exercises. They assess:

- Engineering understanding
- Technical reasoning
- Application of formulas
- Interpretation of engineering data
- Accuracy and precision
- Problem-solving ability
- Workplace readiness

Quality calculation questions should reflect real industrial and workshop situations that learners may encounter in:

- Welding
- Machining
- Fitting and turning
- Automotive systems
- Hydraulics
- Pneumatics
- Power transmission
- Maintenance engineering

Purpose Of Calculation Questions In Mechanical Technology

Calculation questions are used to assess learners' ability to:

- Use engineering formulas correctly.
- Interpret technical data.
- Apply scientific principles.
- Solve engineering problems.
- Calculate dimensions and tolerances.

- Work accurately with units.
- Analyse mechanical systems.
- Make engineering decisions.

Principles Of Quality Calculation Questions

Quality Mechanical Technology calculations must:

- Align with CAPS.
- Reflect workshop and industry applications.
- Be technically accurate.
- Include realistic engineering values.
- Use correct SI units.
- Include proper mark allocation.
- Allow method marks.
- Progress from simple to complex.
- Assess understanding and application.

Types Of Calculation Questions In Mechanical Technology

Common calculation areas include:

Topic	Examples
Welding	Stress, strain, beams loads, framework, material estimation
Machining	Cutting speed, spindle speed
Hydraulics	Pressure and force
Power Transmission	Gear ratios, pulley ratios
Thermodynamics	Efficiency calculations
Automotive	Compression ratio, torque
Engineering Science	Force, power, work, stress, strain
Workshop Practice	Material costing, dimensions

Use Realistic Engineering Scenarios

Calculation questions should simulate workplace situations.

Poor Example

Calculate 120×5 . (2)

Problems:

- Pure arithmetic only.
- No engineering application.
- No technical reasoning.

Improved Mechanical Technology Example

A workshop requires 5 steel bars each measuring 120 mm. Calculate the total material length required. (3)

Why this is better:

- Practical workshop context.
- Technical application.
- Meaningful calculation.

Include Engineering Formulas

Mechanical Technology learners must understand:

- Formula selection
- Formula application
- Correct substitution
- Technical meaning of formulas

Example: Force Calculation

Using Newton's Second Law:

$$F = ma$$

Question

A machine component with a mass of 25 kg accelerates at 4 m/s^2 . Calculate the force acting on the component. (4)

Memorandum

$$F = ma$$

$$F = 25 \times 4$$

$$F = 100 \text{ N}$$

Step	Marks
Correct formula	1
Substitution	1
Calculation	1
Unit	1

Use Correct Si Units

Mechanical Technology relies heavily on correct engineering units.

Common Units

Quantity	Unit
Length	mm, m
Force	N
Pressure	Pa
Power	W or kW
Speed	r/min
Torque	Nm
Temperature	°C

Poor Example

Calculate the pressure.

Problems:

- Unit not specified.
- Unclear expectation.

Improved Example

Calculate the hydraulic pressure in pascals (Pa). (4)

Allow Method Marks

Mechanical Technology calculations often involve multiple steps.

Learners should receive marks for:

- Formula selection
- Correct substitution
- Calculation process
- Correct units

Example: Cutting Speed Calculation**Formula**

$$V = \frac{\pi DN}{1000}$$

Where:

- V = Cutting speed (m/min)
- D = Diameter (mm)
- N = Spindle speed (r/min)

Question

A workpiece with a diameter of 50 mm rotates at 300 r/min. Calculate the cutting speed. (5)

Memorandum

$$V = \pi DN / 1000$$

$$= (3.142 \times 50 \times 300) / 1000$$

$$= 47.13 \text{ m/min}$$

Step	Marks
Formula	1
Substitution	1
Correct working	2
Unit	1

Integrate Theory With Calculations

Mechanical Technology calculations should include understanding and interpretation.

Example

1.1 Calculate the gear ratio of a system with a 20-tooth driver gear and a 60-tooth driven gear. (4)

1.2 Explain how the gear ratio affects output speed. (3)

Why this is quality assessment:

- Combines mathematics and theory.
- Assesses application and understanding.

Use Higher-Order Calculation Questions

Higher-order calculations require:

- Analysis
- Interpretation
- Problem-solving
- Decision-making

Lower-Order Example

Calculate the area of a plate. (4)

Higher-Order Example

A steel support bracket repeatedly bends during operation. The load applied is 3 500 N. Calculate the stress if the cross-sectional area is 70 mm² and explain whether the design is suitable. (8)

(NOTE: This type of question would normally be asked in sub-questions by asking: “Calculate the following:”)

Why this is higher-order:

- Requires calculation.
- Requires interpretation.
- Requires engineering judgement.

Hydraulic Calculations

Formula

$$P = \frac{F}{A}$$

Question

A hydraulic press exerts a force of 12 000 N over an area of 0.02 m². Calculate the pressure developed. (4)

Memorandum

$$\begin{aligned} P &= F/A \\ &= 12\,000 / 0.02 \\ &= 600\,000 \text{ Pa} \end{aligned}$$

Power Calculations**Formula**

$$P = \frac{W}{t}$$

Question

A machine performs 15 000 J of work in 30 seconds. Calculate the power output. (4)

Memorandum

$$P = W/t$$

$$= 15\,000 / 30$$

$$= 500\text{ W}$$

Torque Calculations**Formula**

$$T = Fr$$

Question

A force of 200 N is applied to a spanner 0.25 m long. Calculate the torque produced. (4)

Memorandum

$$T = Fr$$

$$= 200 \times 0.25$$

$$= 50\text{ Nm}$$

Material Estimation Calculations

Mechanical Technology frequently requires material calculations.

Example

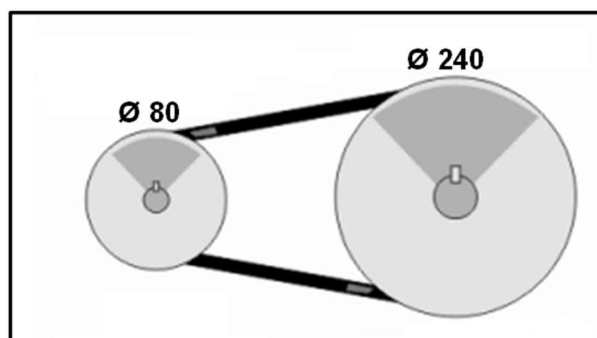
A rectangular frame measures 1 200 mm × 800 mm. Calculate the total material length required including 10% waste allowance. (6)

Include Engineering Drawings And Diagrams

Diagrams improve realism and technical interpretation.

Example

(Insert pulley system diagram)



Example

1.1 Calculate pulley ratio. (4)

1.2 Determine output speed. (4)

Common Errors In Mechanical Technology Calculations

Error	Example
Missing units	No mm, N, Pa
Unrealistic values	Impossible machine dimensions
Incorrect formulas	Wrong engineering principles
No method marks	Final answer only
Pure arithmetic only	No technical application
Poor wording	Confusing instructions
No interpretation	Only calculations assessed

Example Of A Full Quality Calculation Question

Topic: Belt Drive System

A pulley system consists of:

- Driver pulley = 150 mm diameter
- Driven pulley = 450 mm diameter
- Driver speed = 900 r/min

1.1 Calculate the pulley ratio. (4)

1.2 Calculate the speed of the driven pulley. (5)

1.3 Explain how increasing the diameter of the driven pulley affects output speed. (3)

Why this is quality assessment:

- Realistic engineering scenario.
- Multiple cognitive levels.
- Combines theory and calculation.
- Uses technical interpretation.
- Includes application and understanding.

Quality Checklist For Mechanical Technology Calculations

Checklist Item	Yes/No
CAPS aligned	
Realistic engineering context	
Correct formulas	
Correct units	
Method marks included	
Technical accuracy verified	
Appropriate difficulty	
Theory integrated	
Clear instructions	

Recommendations For Educators

Educators should:

- Use workplace engineering scenarios.
- Integrate calculations with theory.
- Include diagrams and engineering drawings.
- Use realistic engineering values.
- Allocate method marks fairly.
- Verify all calculations carefully.
- Include higher-order interpretation questions.
- Avoid pure arithmetic exercises.
- Moderate papers thoroughly.

Calculation questions in Mechanical Technology are essential tools for assessing engineering understanding, technical application, and problem-solving ability. Quality calculation questions should reflect realistic workshop and industrial situations while

assessing learners' ability to apply formulas, interpret engineering information, and make technical decisions.

Well-designed Mechanical Technology calculations prepare learners for workplace demands, further engineering studies, and practical technical problem-solving while ensuring valid, reliable, and fair assessment practices.

9. SETTING HIGHER-ORDER QUESTIONS IN MECHANICAL TECHNOLOGY

Higher-order questions in Mechanical Technology are designed to assess learners' ability to think beyond recall and routine procedures. These questions focus on how well learners can:

- Analyse mechanical systems
- Evaluate engineering solutions
- Solve unfamiliar problems
- Justify decisions using technical reasoning
- Apply knowledge in new or complex contexts

Unlike lower-order questions (which test memory), higher-order questions measure **real engineering thinking and workplace readiness**.

What Are Higher-Order Questions?

Higher-order questions are questions that require learners to:

- Break information into parts (analysis)
- Compare and evaluate options
- Diagnose faults or failures
- Make engineering decisions
- Justify answers with reasoning
- Design or improve systems

They are mainly based on:

- Application (in unfamiliar contexts)
- Analysis
- Evaluation
- Creation (basic design thinking)

Importance In Mechanical Technology

Higher-order questions are essential because Mechanical Technology is a practical engineering subject. Learners must be able to:

- Think like technicians and artisans
- Solve workshop problems
- Interpret machine behaviour
- Identify faults in systems
- Improve designs and processes
- Make safe and efficient decisions

Characteristics Of Higher-Order Questions

A good higher-order question:

- Uses real workplace scenarios
- Requires explanation and reasoning
- Has more than one step of thinking
- May not have a single obvious answer
- Requires justification of answers
- Links theory to practical application
- Uses technical language correctly
- Encourages critical thinking

Cognitive Levels Used

Higher-order questions focus on:

Level	Description
Analysing	Breaking a system into parts
Evaluating	Judging best solution
Applying (advanced)	Using knowledge in unfamiliar situations
Creating	Suggesting improvements or designs

Types Of Higher-Order Questions In Mechanical Technology

Fault Diagnosis Questions

Learners identify causes of mechanical problems.

Example:

A lathe machine produces uneven surface finishes on a workpiece.

Question:

Analyse possible causes of the problem and suggest TWO corrective actions. (6)

Evaluation Questions

Learners compare and justify the best solution.

Example:

Two welding processes (MIG and TIG) are available for thin sheet metal fabrication.

Question:

Evaluate which welding process is more suitable and justify your answer. (6)

Problem-Solving Questions

Learners apply knowledge to unfamiliar situations.

Example:

A gear system is slipping under load.

Question:

Analyse possible reasons for the slipping and recommend solutions. (8)

Design/Improvement Questions

Learners suggest improvements or modifications.

Example:

A pulley system is inefficient and frequently loses power.

Question:

Suggest improvements to increase efficiency and justify your recommendations. (6)

Examples Of Poor vs Improved Higher-Order Questions

✗ Poor Example (Too Low Order)

Define torque. (2)

Problem:

- Only tests memory.
- No reasoning required.

✓ Improved Higher-Order Version

A mechanic uses a longer spanner to loosen a tight bolt instead of a shorter one.

Explain why this makes the task easier and analyse how torque is affected. (6)

Fault Analysis Examples

Example 1

A vehicle engine produces excessive vibration during operation.

Question:

Analyse possible mechanical causes of the vibration and recommend TWO corrective actions. (8)

Expected thinking:

- Unbalanced components
- Loose engine mounts
- Worn bearings
- Misalignment
- Corrective actions linked to causes

Example 2

A belt drive system frequently slips under load.

Question:

Evaluate possible reasons for belt slippage and suggest improvements to prevent it. (8)

Comparison And Evaluation Examples

Example 1

Question:

Compare chain drive and belt drive systems and evaluate which is more suitable for high-torque applications. (8)

Learners must consider:

- Strength
- Maintenance
- Efficiency
- Cost
- Slippage
- Durability

Example 2

Question:

A workshop uses both manual and CNC machines.

Evaluate which system is more efficient for mass production and justify your answer. (6)

Application In Unfamiliar Contexts

Example

A hydraulic jack is used to lift a heavier load than it was designed for.

Question:

Analyse the risks involved and explain what mechanical principles are affected. (6)

Design And Improvement Questions

Example

A workshop experiences frequent tool wear during machining operations.

Question:

Suggest improvements to reduce tool wear and justify each recommendation. (8)

Possible answers:

- Correct cutting speed
- Proper lubrication
- Suitable tool material
- Reduced feed rate

Integrated Calculation + Higher Order Thinking

Example

A pulling force of 110 kN is applied to a solid mild-steel shaft. The resistance area of the shaft is $7,07 \times 10^{-4} \text{ m}^2$. After the force has been applied to the shaft, the original length extends by 0,0001 m.

$$P = \frac{F}{A} \quad \text{and} \quad A_{shaft} = \frac{\pi d^2}{4}$$

Question:

Calculate the diameter of the shaft in mm. (5)

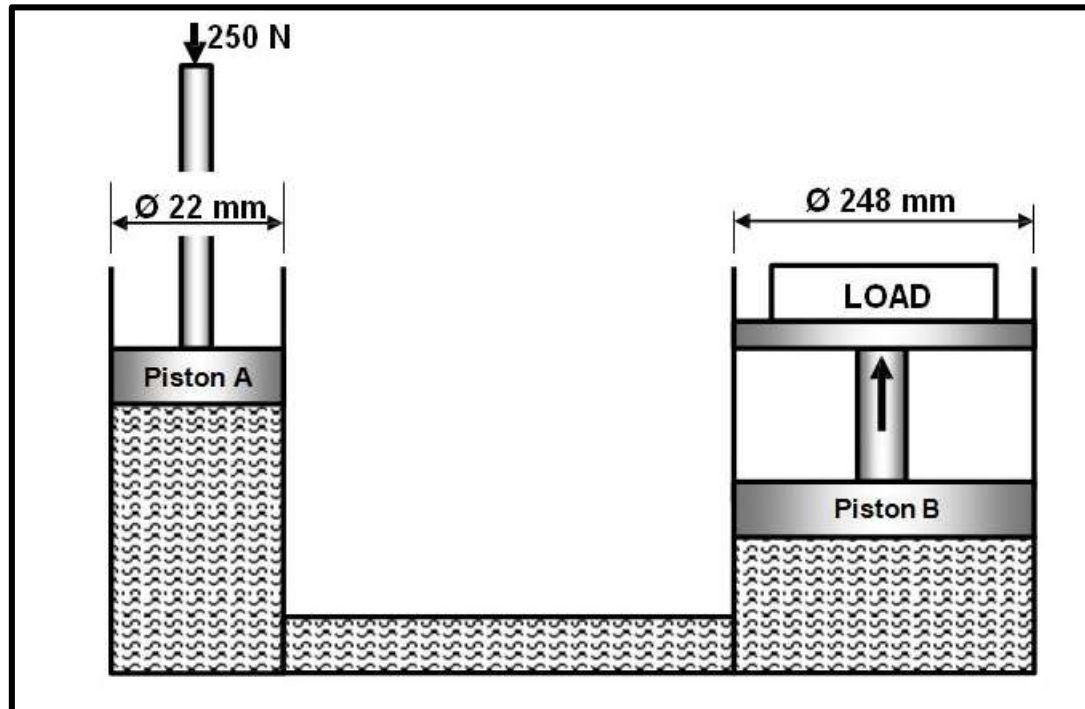
Why this is higher order:

- Requires calculation
- Requires interpretation
- Requires judgement

Diagram-Based Higher-Order Questions

Example

(Insert diagram of hydraulic system)



Example

Question:

The hydraulic system shown is not producing the expected displacement.

Analyse the diagram and determine through calculation the displacement of Piston B. (6)

Common Mistakes In Higher-Order Questions

Mistake	Example
Only recall-based questions	“What is a gear?”
No scenario provided	Abstract theory only
No reasoning required	Single-word answers
Too vague	“Discuss machines”
No marks for explanation	Only final answer marked
Unrealistic workplace context	No industry relevance

Quality Checklist For Higher-Order Questions

Before finalising, check:

Checklist Item	Yes/No
Real-world engineering context	
Requires analysis or evaluation	
More than one possible thought process	
Requires justification	
CAPS aligned	
Technically accurate	
Appropriate cognitive level	
Clear instructions	
Realistic mark allocation	

Mark Allocation For Higher-Order Questions

Higher-order questions typically require:

- More explanation
- Reasoning steps
- Justification

Example guideline:

Task	Marks
Identification of problem	2
Analysis of causes	2–3
Recommendation	2–3
Justification	2–3

Recommendations For Educators

Educators should:

- Use real workshop problems.
- Avoid simple recall questions for higher-order assessment.
- Encourage reasoning and justification.
- Integrate theory with practice.
- Use diagrams and case studies.
- Allow multiple valid solutions where appropriate.
- Focus on engineering thinking, not memorisation.
- Align with CAPS cognitive weighting.

Higher-order questions in Mechanical Technology are essential for developing critical thinking, technical reasoning, and problem-solving skills. These questions prepare learners for real engineering environments where they must analyse faults, evaluate systems, and make informed decisions.

Well-constructed higher-order questions improve the quality of assessment by ensuring learners are not only knowledgeable but also capable of applying, analysing, and evaluating mechanical systems in practical, real-world contexts.

10. COMMON ERRORS IN QUESTION PAPERS

Many examination papers are rejected or returned during moderation because of avoidable errors. Educators must carefully quality-check papers before submission.

Common problems include:

- Questions outside the prescribed syllabus.
- Incorrect cognitive weighting.
- Incorrect mark calculations.
- Poor grammar and spelling.
- Ambiguous wording.
- Repetition of questions.
- Incorrect numbering.
- Missing diagrams or labels.
- Unrealistic time allocation.
- Incomplete memoranda.

- Poor layout and formatting.
- Questions copied directly from textbooks.
- Questions that are too easy or too difficult.
- Over-assessment of lower-order thinking.
- Lack of practical application questions.

Examples of moderation findings

Moderation Finding	Impact
Poor cognitive balance	Non-compliance with CAPS
Incorrect memo	Unfair marking
Ambiguous questions	Learner confusion
Incorrect numbering	Administrative errors
Missing instructions	Learner uncertainty
Unrealistic paper length	Learners unable to finish

Strategies to reduce errors

- Use peer review.
- Conduct internal moderation.
- Use a quality checklist.
- Read paper aloud before finalising.
- Verify all calculations.
- Cross-check memo against questions.
- Ensure numbering matches memorandum.
- Verify diagrams and illustrations.

Common problems include:

- Questions outside syllabus.
- Incorrect mark totals.
- Poor grammar.
- Ambiguous instructions.
- Repetition of questions.
- Incorrect numbering.
- Cognitive imbalance.
- Overly difficult questions.
- Unrealistic time allocation.
- Inaccurate memoranda.

11. QUESTION PAPER AND MARKING GUIDELINE DEVELOPMENT

A professionally presented technical question paper is important because it supports both the quality of assessment and the learners' ability to demonstrate their knowledge fairly.

Key reasons include:

- **Enhances readability** by using a clear, logical layout that makes questions easy to follow.
- **Reduces learner confusion** through consistent numbering, spacing, and formatting.
- **Improves assessment validity** by ensuring learners are assessed on knowledge and skills rather than their ability to interpret a poorly presented paper.
- **Reflects professionalism** and demonstrates that the assessment has been carefully prepared and quality assured.
- **Supports technical accuracy** by presenting diagrams, symbols, dimensions, and engineering terminology correctly.
- **Minimises errors** by ensuring marks, question numbers, instructions, and page references are accurate and consistent.
- **Promotes fairness** by providing all learners with the same clear and accessible assessment.
- **Improves time management** as learners can locate information quickly and spend more time answering questions.
- **Maintains examination standards** in line with DBE, CAPS, and assessment policy requirements.
- **Facilitates marking and moderation** by presenting questions and mark allocations clearly, enabling consistent interpretation by markers and moderators.
- **Projects credibility** of the subject and the examining body, increasing confidence in the assessment process.
- **Supports higher-order thinking** by allowing learners to focus on solving technical problems instead of deciphering unclear instructions or poor formatting.

In Mechanical Technology, a professional technical layout is especially important because assessments often include engineering drawings, diagrams, tables, formulae, symbols, and calculations. Accurate formatting ensures these technical elements are interpreted correctly, allowing learners to demonstrate their true level of competence.

Question paper layout

The aim is to assist examiners and moderators with the setting of high-quality examination material that is clear and accessible to all learners.

1. Table setup.

Tables are used to standardise and align all question numbers, text, diagrams, and mark allocations. The following steps can be followed to set up a table in MS Word.

Step 1: Open a new MS Word Document.

Step 2: Click on the Layout Tab

Click on “Margins” drop down arrow and select “Custom Margins”.

Change the margins to the following:

Top: 1,27 cm Bottom: 1,27 cm

Left: 1,9 cm Right: 2,25 cm

Step 3: Click on the “Insert” tab.

Click on “Table” drop down arrow and move the mouse across the cells until a 5 x 1 table is highlighted in orange and click on the orange highlighted cells.

Now 5 evenly sized cells will appear on the page.

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Step 4: For Table Width:

Adjust all tables as indicated in examples below

Table sizes and dimensions are all in cm.

Header table

16,19 cm	0,45 cm →	1,6
----------	-----------	-----

Question table

1,69 cm	14,50 cm		
---------	----------	--	--

Multiple choice table

1,69 cm	1 cm	13,5 cm		
---------	------	---------	--	--

Sub question table

1,69 cm	2 cm	12,5 cm		
---------	------	---------	--	--

Step 5: View Gridlines:

Click anywhere inside the table, you will note that two extra tabs are added to the ribbon on top of the Word display screen in blue text. “Table design” and “Layout”.

Click on the blue “Layout” tab and select “View Gridlines”.

Now highlight the table and go to the “Home” tab and click on the dropdown arrow for borders in the paragraph section and select “No borders”.

The outlines of the table will be displayed as light grey dotted lines.

	2.3.1		(3)
--	-------	--	-----

	2.3.2		(5)
			[10]

Below are examples of a proper layout (Note: Table lines included as to show how it should look like)

This forms the base table to which you can add rows.

QUESTION 1: MULTIPLE-CHOICE QUESTIONS (GENERIC or SPECIFIC)		
--	--	--

Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1 to 1.6) in the ANSWER BOOK, e.g. 1.7 E.		
--	--	--

1.2		
-----	--	--

	A B C D			
				(1)
				[6]

QUESTION 2: SAFETY (GENERIC)		
-------------------------------------	--	--

2.1		
-----	--	--

	2.1.1	The strain caused if the change in length of the bar is 0,05 mm		(2)
--	-------	---	--	-----

	2.1.2	State FOUR visual requirements during the visual inspection process of welded joints.		(2)
--	-------	---	--	-----

2.2				(2)
-----	--	--	--	-----

2.3				
-----	--	--	--	--

				
	FIGURE 2.3			

	2.3.1			(3)
--	-------	--	--	-----

	2.3.2			(5)
				[10]

Below are general instructions for setting the paper:

1. Font must be ARIAL 12.
2. All heading must be BOLD and UPPERCASE (see example).
3. Insert tables after setting of MS Word Margins has been done
4. There must be an open line between each question and answer (see examples of the macro layout.).
5. All figures must be placed as jpg doc in the middle of the macro. In the main tabs on top, click on Format, click on picture border and all picture borders must then be 1.5. Any pictures drawn in MSWord must be left as is.
6. Totals of question must be in the right column, and in the Layout tab, select spaced bottom right.
7. There must be no line opening between the last question and the total of the question.
8. Only TOTAL heading is on the last page under the last sub-question total. No other questions must the word TOTAL or QUESTION TOTAL be.
9. Cover page and document name must state: **Name of Subject – “Specialisation”**.
10. In the Marking Guidelines, do not use Picture for the tick-mark; go to insert. Symbol, Wingdings 2 and select the tick-mark from there. There must be one space before and after each tick-mark, for example. ✓
11. In the calculations, as far as possible use MSWord especially where it is calculations without fractions. Use Microsoft Equation 3.0 only for fractions when it is required.
12. All calculations must be ARIAL 12, except special characters for e.g. π , θ . It must be Times New Roman 12.
13. Possible answers MUST each question start on a new page.
14. All bullets must be to the left in the block of the macro.

Each question answer in the must have headings in bold ended with a colon “:”

A quality memorandum is essential for reliable marking.

The memorandum should:

- Instructions to markers.
- Include all acceptable answers.
- Allocate marks clearly.
- Include alternative responses where appropriate.
- Indicate method marks.
- Use consistent marking principles.

Example of Memo Structure

2.1	Horizontal band saw (Already been switched on):		
	• Never leave the band saw unattended while in motion. ✓ • Switch off the band saw when leaving. ✓ • Use a brush or wooden rod to remove chips. ✓ • When reaching around a revolving band saw, be careful that your clothes do not get caught in the blade. ✓ • Don't stop a revolving bandsaw blade with your hand. ✓ • Don't adjust the band saw while working. ✓ • Don't open any guard while in motion. ✓ • Keep hands away from action points. ✓ • Do not force the band saw blade into the material. ✓ • Apply cutting fluid if required. ✓ (Any 2 x 1)		(2)
2.2	First aid basic treatment:		
	• Examination ✓ • Diagnosis ✓ • Treatment ✓		(3)
2.3	Oxygen fittings with oil and grease:		
	It forms a flammable mixture. ✓		(1)
2.4	Disadvantages of the process layout:		
	• Production is not always continuous. ✓ • Transportation costs between process departments may be high. ✓ • Additional time is spent in testing and sorting as the product moves to the different departments. ✓ • Damage to fragile goods may result from extra handling. ✓ (Any 2 x 1)		(2)

12. MODERATION OF TESTS AND EXAMINATIONS

Moderation is a formal quality assurance process aimed at improving assessment quality, fairness, reliability, and policy compliance.

Moderation is not intended to criticise educators but rather to improve the quality of assessment practices.

Objectives Of Moderation

Moderation ensures that:

- Assessment complies with CAPS.
- Standards are maintained.
- Questions are technically correct.
- Cognitive levels are balanced.
- Marking is fair and consistent.
- Learners are assessed fairly.
- Assessments are valid and reliable.

Types Of Moderation

Pre-Moderation

Conducted before learners write the assessment.

Purpose:

- Identify errors.
- Improve question quality.
- Verify compliance.
- Correct technical mistakes.

During Moderation

Conducted while assessment is administered.

Purpose:

- Ensure proper administration.
- Monitor examination procedures.
- Ensure fairness and integrity.

Post-Moderation

Conducted after marking.

Purpose:

- Verify marking accuracy.
- Check memorandum application.
- Standardise marking.
- Analyse learner performance.

Internal Moderation

Conducted at school level by:

- Head of Department
- Subject Head
- Senior educator
- School Management Team

External Moderation

Conducted by:

- Subject advisors
- District officials
- Provincial moderators
- Umalusi representatives

Moderators check:

- CAPS compliance
- ATP alignment
- Cognitive levels
- Language

Moderation improves quality and compliance.

Internal Moderation

Conducted by:

- Head of Department
- Senior educator
- Subject specialist

External Moderation

Conducted by:

- Subject advisors
- District officials
- Provincial moderators

Moderators check:

- CAPS compliance
- Cognitive levels
- Language quality
- Marking accuracy
- Memorandum quality
- Technical correctness
- Time allocation
- Layout and formatting

13. QUALITY CHECKLIST FOR EXAMINATIONS

Before finalising the paper, verify:

##	DETAIL CLEARLY INDICATED and CORRECT	Y	N	COMMENTS
1	School Cover Page with Subject Name			
2	Date of Assessment and Time / Duration of Paper			
3	Examiners Name AND Moderators Name			
4	Instructions to Learners			
5	Total Mark for Complete Paper - Added Correctly and Displayed			
6	Marks per Section - Total Added Correctly and Displayed			
7	Marks per Sub-Question - Displayed			
8	Question Numbering, Diagram / Table Referencing & Page Numbers			
9	Questions Aligned with Curriculum (Table Below) & Work Schedule			
10	Cognitive Levels & Complexity Weighting Applied (Blooms completed)			
11	Academic Language Style and Spelling			
12	Blend: Multiple Choice, Short, Long Questions, Labelling			
13	Includes Graphs, Diagrams, Sketches, Cartoons etc			
14	First Draft Approved			
15	Clear Type Font Appropriate for Mass Reproduction - no fading			
16	Memorandum Covers All Permutations / Options - User Friendly			
17	Tick Marks on Memorandum Reflects Total Mark Allocation per Question			
18	Question Paper Numbering Aligned with Memorandum Numbering			
19	Digital Format for Effective Storage, Modification and Reuse			
20	Scanned Images - Avoiding Manual Cut & Paste			
21	Un-altered Grade 12 Formula Sheet attached for All Grades			
22	Final Version with ALL Images and Attachments Included - Approved			

14. FORMATTING OF QUESTION PAPERS

Good formatting includes:

- School/department heading
- Subject and grade
- Date and duration
- Total marks
- Clear numbering
- Adequate spacing
- Consistent font size
- Proper margins
- Page numbering

15. POST-ASSESSMENT ANALYSIS

Post-assessment analysis refers to the systematic review and evaluation of a question paper and learner performance after an assessment has been written and marked. It involves examining how learners performed on each question, identifying patterns of success and difficulty, and determining whether the assessment effectively measured the intended learning outcomes as outlined in CAPS. This process helps educators and examiners understand whether questions were too easy, too difficult, unclear, or well-balanced across cognitive levels.

In Mechanical Technology, post-assessment analysis is important for improving future question papers and teaching strategies. It allows educators to identify topics where learners struggled, such as calculations, diagrams, or system analysis, and to adjust teaching methods or provide targeted remediation. It also helps to evaluate the quality of the question paper in terms of validity, reliability, mark allocation, and cognitive distribution (L1–L6). Poorly performing questions may indicate issues such as unclear wording or content not adequately taught.

Furthermore, post-assessment analysis supports continuous improvement in assessment quality and learner achievement. It ensures that future assessments are more accurate, fair, and aligned to curriculum expectations. The findings can be used in moderation reports, subject meetings, and departmental planning to strengthen teaching and learning. Ultimately, it is a key quality assurance process that enhances both educator effectiveness and learner performance.

After marking, educators should conduct analysis.

Analysis includes:

- Learner performance trends
- Frequently missed questions
- Item analysis
- Cognitive performance analysis
- Teaching gaps identified

Benefits:

- Improves future teaching.
- Improves future assessment quality.
- Supports intervention planning.

16. ETHICAL CONSIDERATIONS IN ASSESSMENT

Ethical considerations in assessment refer to the principles and standards that ensure all assessment practices are fair, transparent, honest, and respectful of learners' rights. In education, especially in subjects like Mechanical Technology, ethics in assessment ensure that learners are evaluated on their true ability and not disadvantaged by bias, poor paper setting, or unfair practices. Ethical assessment practices are guided by national policies such as CAPS, the National Protocol for Assessment, and professional teaching standards, all of which promote integrity, accountability, and fairness in the assessment process.

One of the key ethical requirements is fairness and equity. This means that all learners must have equal opportunity to demonstrate their knowledge and skills, regardless of background, language ability, or learning barriers. Question papers must avoid bias, unclear language, or content that was not taught. Ethical assessment also requires that difficulty levels, mark allocation, and cognitive distribution are appropriate and consistent. In Mechanical Technology, this includes ensuring that technical language is accessible, diagrams are clear, and tasks reflect what was taught in both theory and practical workshop sessions. It is unethical to deliberately set overly difficult or misleading questions that disadvantage learners.

Another important aspect is integrity and honesty in assessment design and administration. Educators and examiners must not copy questions without adaptation, leak papers, or give unfair advantage to certain learners. Confidentiality of question papers must be maintained before the assessment, and marking must be consistent and transparent using approved memoranda and rubrics. Ethical conduct also includes avoiding plagiarism in question setting and ensuring that all sources are properly adapted or referenced. Learner work must be assessed fairly without favouritism or prejudice.

Ethical considerations also include validity and accountability. Assessments must measure what they are intended to measure, aligned with CAPS and the learning outcomes. Setting questions outside the taught curriculum or manipulating marks to improve results undermines the credibility of the assessment system. Educators are accountable for ensuring that assessment decisions are justifiable and evidence-based. Moderation processes further support ethical practice by checking the quality and fairness of assessments before and after they are administered.

Finally, ethical assessment practice promotes professional responsibility and learner development. The purpose of assessment is not only to measure performance but also to support learning and improvement. Educators must use assessment results responsibly to identify learning gaps, provide feedback, and improve teaching strategies. Ethical assessment therefore builds trust in the education system, ensures credible certification, and supports the development of competent, skilled learners in Mechanical Technology who are prepared for real-world technical environments.

Educators must:

- Maintain confidentiality.
 - Avoid leaking papers.
 - Ensure fairness.
 - Mark objectively.
 - Prevent cheating.
 - Apply consistent standards.
-

17. RECOMMENDATIONS FOR EDUCATORS

Educators should:

- Attend assessment workshops regularly.
 - Collaborate during paper setting.
 - Use moderation feedback constructively.
 - Analyse learner performance continuously.
 - Align assessment with CAPS and ATP.
 - Develop quality memoranda.
 - Improve questioning techniques.
 - Include higher-order thinking questions.
-

18. CONCLUSION

The setting of quality tests and examinations is a professional responsibility that directly impacts learner achievement and curriculum delivery. Effective assessment practices ensure valid measurement of learner knowledge, skills, values, and competencies while promoting fairness, reliability, and academic integrity.

Well-designed assessments provide meaningful information to educators, learners, schools, districts, and the education system as a whole. Through careful planning, policy compliance, moderation, and continuous improvement, educators can develop assessments that support quality teaching and learning while preparing learners for further education, training, and the workplace.