



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## **SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS**

**AGRICULTURAL TECHNOLOGY**

**MAY/JUNE 2025**

**MARKING GUIDELINES**

**MARKS: 200**

**These marking guidelines consist of 15 pages.**

**SECTION A****QUESTION 1**

1.1	1.1.1	D✓✓		
	1.1.2	B✓✓		
	1.1.3	A✓✓		
	1.1.4	B✓✓		
	1.1.5	B✓✓		
	1.1.6	B✓✓		
	1.1.7	A✓✓		
	1.1.8	B✓✓		
	1.1.9	D✓✓		
	1.1.10	D✓✓	(10 x 2)	(20)
1.2	1.2.1	scheduling ✓✓		
	1.2.2	septic tank ✓✓		
	1.2.3	copper ✓✓		
	1.2.4	Vesconite ✓✓		
	1.2.5	gear ✓✓	(5 x 2)	(10)¶
1.3	1.3.1	B✓✓		
	1.3.2	A✓✓		
	1.3.3	F✓✓		
	1.3.4	G✓✓		
	1.3.5	H✓✓	(5 x 2)	(10)

**TOTAL SECTION A: 40**

**SECTION B****QUESTION 2: MATERIALS AND STRUCTURES**

**Start this question on a NEW page.**

**2.1 TWO alloy elements in stainless steel to reduce magnetism.**

- Manganese✓
- Chromium✓

(2)

**2.2 Complete the following table:**

METAL ALLOY	COMPOUND	APPLICATION
Brass		<p><b>2.2.1</b> Music instruments Rods✓, Rivets✓, Pinions✓, Motion sensors✓ (Any 1)</p> <p><b>2.2.2</b> Unions✓, Terminals✓, Spindles✓, Screws✓, Jets✓, Injectors✓, Cable glands✓ (Any 1)</p>
Bronze	<p><b>2.2.3</b> Tin✓ <b>2.2.4</b> Copper✓</p>	

(4)

**2.3 THREE reasons that make Tin a suitable metal for the coating of food cans.**

- It resists oxygen and water.✓
- Will not contaminate the contents.✓
- Hygienic.✓

(3)

**2.4 ONE property and ONE use for the Bakelite as a synthetic material.**

Property:

- Heat resistant✓
- Non-conductive✓

(Any 1)

AND

Use:

- Inverter welding machine electrode holder covers.✓

(2)

**2.5 The term describing inherent strength of an adhesive.**

Cohesion.✓

(1)

**2.6 FOUR properties that make fibreglass a suitable material to manufacture seed bins for planters.**

- Lightness.✓
- Can be formed into any shape.✓
- Easy to colour.✓
- Can be sawn, drilled, and filed.✓
- Toughness.✓
- Easy repaired when broken.✓

(Any 4) (4)

**2.7 THREE advantages for the use of Vesconite as used in the agricultural sector.**

- Does not corrode.✓
- Non-conductive.✓
- Easy to fit and remove.✓
- Will not wear shafts and liners.✓
- Does not expand.✓
- Does not overheat or burn.✓
- Resistant to a wide range of chemicals.✓

(Any 3) (3)

**2.8 Explanation why Teflon is used as a surface coating in the manufacturing of cooking utensils.**

Teflon has a very high melting point✓ of 327 °C✓ and also has very good non-stick properties.✓ It is inert✓ to practically all commercial household chemicals✓, acids✓, alcohols✓ and solvents.✓ Teflon will not contaminate food✓ and will not absorb moisture.✓

(Any 4) (4)

**2.9 2.9.1 Tensioners in PICTURE A and B.**

- A – Tensioner spring.✓  
 B – Adjustable/ratchet tensioner/Wire strainer.✓

(2)

**2.9.2 Tensioner best suitable for applying tension over long distance fences.**

B✓

(1)

**2.9.3 TWO materials used to manufacture the isolator.**

- Ceramic.✓
- Porcelain.✓
- Glass.✓
- Plastic.✓

(Any 2) (2)

**2.10 TWO types of batteries that can be used to power the energizer.**

- Dry disposable✓
- 12 volt wet rechargeable✓
- Lithium battery✓

(Any 2) (2)

**2.11 THREE points to remember when placing safety signs on an electrical fence.**

- Place on all gates, doors and fences to warn people of potential dangerous situations or places.✓
  - Signs must be large and colourful so that people/children and illiterate persons can identify and or notice it easily.✓
  - High enough to be out of reach of thieves.✓
  - High enough to be out of reach of vandals.✓
  - High enough to be out of reach of animals.✓
- (Any 3) (3)

**2.12 A suitable material used to manufacture the earth spikes. Motivate.**

Copper✓

Motivation

- It must a good conductor of electricity✓
- Should not rust easily✓

(Any 1) (2)  
[35]

**QUESTION 3: ENERGY****Start this question on a NEW page.****3.1 Image of the photovoltaic solar system****3.1.1 THREE methods that can be used to protect the surface of the solar panels.**

- Silicon coating✓
- Teflon coating✓
- Tempered glass layer✓

(3)

**3.1.2 Unit used to indicate the output power of the system.**

Watts✓

(1)

**3.1.3 Discussion of the aspects that have an influence on the efficiency of the photovoltaic solar system.**

- The number of solar panels determine the efficiency of the system. The more the better.✓
- Expensive energy technologies produce more efficient energy than cheaper versions.✓
- The location of the installation plays a crucial part in the efficiency of the solar panel system.✓
- The direction at which the solar panels are facing.✓ Must face direct sunlight.
- The presence of obstructions to the sun rays. For instance: Trees, buildings, mountains.✓

(Any 4) (4)

**3.1.4 Energy source obtained from the sun rays to generate electricity with a photovoltaic solar system.**

Light photons.✓

(1)

**3.2 THREE benefits of wind turbines on a farm.**

- Free electricity after initial-cost recovery.✓
- Increased property values.✓
- Reliable electricity.✓
- Relief from high and unstable prices of other forms of electricity.✓
- Personal energy independence.✓
- Supports clean energy.✓
- Fights global warming.✓

(Any 3) (3)

**3.3 Description of the limitations of geothermal energy sources.**

Geothermal hotspots are limited✓ and land surveys takes several years to complete.✓ Most geothermal hotspots are near volcanic locations✓ and the rocks may not be soft enough to drill.✓ The hotspot may suddenly stop producing steam✓ and harmful gases can escape from deep within the earth.✓

(Any 4) (4)

**3.4 TWO and advantages and TWO disadvantages of biofuel.**

<b>TWO ADVANTAGES</b>	<b>TWO DISADVANTAGES</b>
<ul style="list-style-type: none"> <li>• Biodegradable and do not harm the environment.✓</li> <li>• Less polluting.✓</li> <li>• Conventional fuels take years to regenerate.✓</li> <li>• Doesn't require any radical changes to switch to the use of biofuels.✓</li> <li>• Renewable source of energy.✓</li> <li>• Ethanol as a biofuel is very inexpensive to produce.✓</li> <li>• Can help prevent engine knock.✓</li> </ul> <p style="text-align: right;">(Any 2)</p>	<ul style="list-style-type: none"> <li>• Low energy output.✓</li> <li>• Lead to an imbalance in crop production.✓</li> <li>• There is a huge quantity of water required.✓</li> <li>• More habitats will be lost due to the production of crops for biofuel.✓</li> <li>• Less food production will increase prices and cause a rise in inflation.✓</li> </ul> <p style="text-align: right;">(Any 2)</p>

(4)  
[20]

**QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES**

4.1 4.1.1 Stick/arc welding/Inverter welder✓

The wind has no influence✓ on the arc welding process and it is very portable because of the compact size✓ of the machine. (3)

4.1.2 **THREE point for a beginner welder to consider.**

- Required PPE must be worn.✓
- Surface area must be cleaned thoroughly.✓
- Gravity can cause metal to drip or run down.✓
- Keep puddle small.✓
- Prevent over penetration, burning through.✓
- Electrode size plays a role in penetration.✓
- Current plays a dominant role in the welding process.✓

(Any 3) (3)

4.2 4.2.1 **Component that feeds the wire through the nozzle of the torch.**

B✓ (1)

4.2.2 **Name and description of part A.**

Tensioner✓  
To set the correct tension✓ between the wire feeding rollers.✓ (3)

4.2.3 **TWO measures that can be incorporated in the MIG welding process to prevent porosity.**

- Correct gas flow setting.✓
- Make sure nozzle is not blocked.✓
- No leaking gas lines.✓
- Avoid draughty conditions.✓
- Correct nozzles distance from work piece.✓
- No painted, wet or oily work pieces.✓
- Ensure that the electrode/wire is not wet or rusty.✓

(Any 2) (2)

4.2.4 **THREE advantages of MIG welding.**

- The ability to join a wide range of metals and thicknesses.✓
- All-position welding capability.✓
- A good weld bead.✓
- A minimum of weld splatter.✓
- Easy to learn.✓
- Potentially cheaper.✓
- Uninterrupted welding runs.✓
- Uninterrupted swislopes✓

(Any 3) (3)

**4.2.5 THREE precautionary measures to apply before welding start with a MIG welding machine.**

- Appropriate safety gear.✓
- Make sure that the valve to the shielding gas is open✓ and that you have around 14LPM flowing through the regulator.✓
- The welding machine needs to be turned on.✓
- Earth clamp attached to your welding table or to the metal.✓
- Correct current setting and wire feed speed.✓

(Any 3) (3)

**4.3 Controlling distortion ensures a proper welding joint.**

**4.3.1 Do you agree with this statement? Motivate your answer.**

Yes✓

When metal is heated it expands and when it cools down it shrinks and shrinking of welded metal, as well as weld runs, causes distortion of sheets when they cool down.✓ Shrinking takes place in all directions simultaneously and therefore causes various types of distortion.✓

(3)

**4.3.2 TWO methods of controlling distortion before welding starts.**

- Pre-setting.✓
- Clamping.✓

(2)

**4.4 Image of the Oxy-Acetylene apparatus**

**4.4.1 Gas in the cylinders A and B.**

- A- Oxygen✓  
B- Acetylene✓

(2)

**4.4.2 Explanation why gas cylinders should be stored and fastened in an upright position.**

The cylinder can fall over causing the main valve to break✓ and the cylinder will become a missile causing damage or even death.✓

(2)

**4.4.3 Description of the difference between the thread on acetylene cylinder and the CO<sub>2</sub> gas cylinder of the MIG welding machine.**

Acetylene cylinders have anti clockwise thread and CO<sub>2</sub> cylinders have clockwise thread.✓ Acetylene gas is flammable✓ and the thread prevents it to be coupled to a MIG welding machine.✓

(3)

**4.4.4      The correct PPE to wear when cutting with the Oxy- Acetylene cutting apparatus with a motivation.**

A✓

Do not use sunglasses because they do not filter the extreme ultraviolet light as effectively.✓ The plastic used in sunglass lenses will not protect your eyes from sparks.✓

(3)

**4.4.5      Witch valve on the torch to be closed first with a motivation.**

Acetylene✓

It will extinguish the flame.✓

(2)

[35]

**QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT**

Start this question on a NEW page.

**5.1 Mass displacement****5.1.1 Normal centre of gravity point when no load is carried.**

A✓ (1)

**5.1.2 Point to where the centre of gravity moves when a heavy bale is lifted.**

C✓ (1)

**5.1.3 Point to where the centre of gravity moves when a heavy bale is carried closer to the ground.**

B✓ (1)

**5.1.4 Advise on carrying the load in a higher position with a motivation.**

Not advisable.✓

In the raised position, the tractor is less stable ✓ and the potential for side overturn increases. ✓

(3)

**5.2 Lucerne cutting machine****5.2.1 Safety device installed to alert bystanders.**

- Beeper/warning sound/hooter✓
  - Reverse lights✓
- (Any 1) (1)

**5.2.2 FIVE points to remember when repairs are done on worn cutting blades.**

- Lower the cutting header to the ground.✓
  - If cutting header is raised, place trestles underneath.✓
  - Switch off the engine of the machine.✓
  - Disengage the blades.✓
  - Wear safety gloves.✓
  - Replace all worn parts with the same size and type.✓
  - Sharpen all blunt blades.✓
- (Any 5) (5)

**5.2.3 Hydraulic cylinder to be installed with a motivation.**

Single-action hydraulic cylinder.✓

The weight of the header will lower the cutting height.✓

(2)

**5.2.4 TWO advantages of using the cutting machine to manual labour.**

- Time saving.✓
- Can cover large areas.✓
- Labour saving/one-man operation.✓
- Precise operation.✓

(Any 2) (2)

**5.2.5 Technology used to guide the operator.**

GPS (Global Positioning System)✓

(1)

**5.3 5.3.1 Device and its function.**

Universal joint✓

Allows the shaft to operate at an angle.✓

(2)

**5.3.2 Fitment of device.**

Drive shafts.✓

(1)

**5.3.3 Identify and function of part A.**

Grease nipple.✓

Enables the operator to apply grease to the device✓ to ensure smooth operation.✓

(3)

**5.4 ONE safety device fitted between the PTO shaft and the flywheel.**

- Safety clutch/ slip clutch.✓
- Shear bolt.✓

(Any 1) (1)

**5.5 FOUR actions before storing the baling machine after use.**

- Remove all bales from baling chamber.✓
- Clean the baler properly.✓
- Drain and replace all oil.✓
- Releases the tension on all drive belts.✓
- Remove all chains, clean and oil them, and replace them.
- Dismantle all slip clutches, clean them and reassemble them, but do not put the springs under tension.✓
- Totally reduce bale chamber tension.✓
- Cover all unpainted areas with a thin layer of grease.✓
- Grease all grease nipples.✓
- Store baler in a dry place under cover.✓

(Any 4) (4)

**5.6 Image of a quick hitch coupling used on a tractor.****5.6.1 Explanation of the reason for using this coupling.**

- The coupling is used to hitch the implement fast ✓ and easy.✓
- The coupling also makes it possible for one person to hitch the implement alone.✓

(3)

**5.6.2 THREE advantages of the use of the attachment.**

- Time saving when hitching an implement.✓
- One-man operation.✓
- No need to adjust the space between two lifting arms for each implement.✓
- Various implements can be hitch to the same attachment. ✓

(Any 3) (3)

**5.7 Gear system****5.7.1 Identification of the type of gear.**

Spur gear.✓

(1)

**5.7.2 ONE disadvantage of the gear system.**

Noisy.✓

(1)

$$\text{Ratio} = \frac{\text{Drive gear}}{\text{Driven gear}} \checkmark$$

$$= \frac{45}{15} \checkmark$$

$$= 3 \checkmark$$

$$\text{Ratio} = 1:3 \checkmark$$

(4)  
[40]

**QUESTION 6: WATER MANAGEMENT****6.1 Irrigation systems****6.1.1 Irrigation system on large maize fields with a motivation.**

A✓

AND

- One-man operation.✓
- Sprayers will not damage the maize due to height.✓
- Easy moveable.✓
- More cost effective.✓

(Any 2) (3)

**6.1.2 TWO methods in which a farmer can use to reduce water wastage.**

Installation of:

- Water probes.✓
- Irrigation timers.✓
- Drip irrigation.✓
- Micro irrigation.✓

(Any 2) (2)

**6.1.3 THREE disadvantages of a centre pivot irrigation system.**

- High initial cost.✓
- Expensive to repair.✓
- Load shedding is a problem.✓
- Theft of parts.✓
- Cannot irrigate against steep slopes.✓
- Wheels can get stuck.✓
- Over irrigation might occur.✓

(Any 3) (3)

**6.1.4 TWO preventative measures to limit theft of copper cables.**

- Painting them.✓
- Putting them inside pipes.✓
- Putting them underground.✓
- Alarm system.✓
- Cameras.✓

(Any 2) (2)

**6.2 Matching the water pipe fittings to the question number.**

6.2.1 C✓

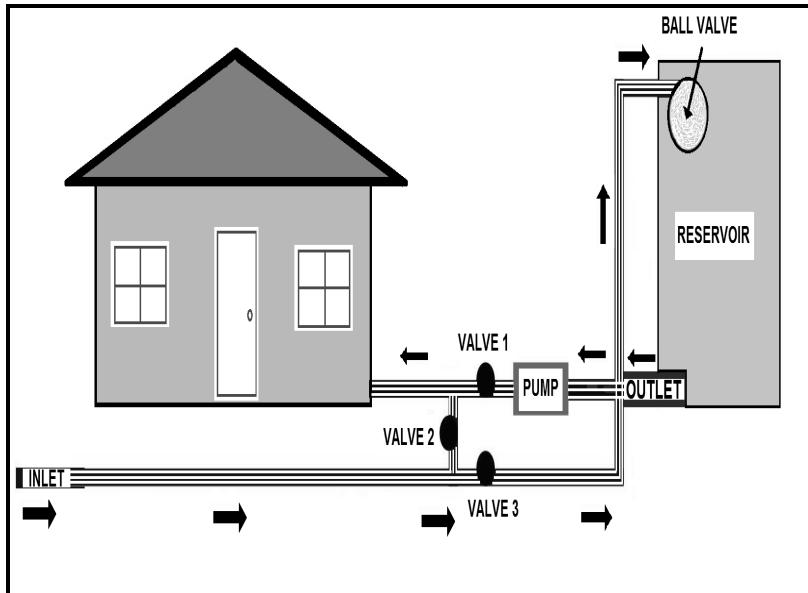
6.2.2 A✓

6.2.3 B✓ (3)

## 6.3 6.3.1 Labelled sketch making use of criteria:

<b>Items are in the correct order✓</b>	<b>1</b>
<b>Labelling/Inscription of inlet and outlet flow of water✓✓</b>	<b>2</b>
<b>Correct functioning of system✓</b>	<b>1</b>

(4)



(4)

## 6.3.2 Explanation of the working principle of the backup system.

Water enters the reservoir from the main inlet valve✓ via the ball valve✓ and water exits the reservoir from the outlet via the use of a pressure pump✓ back into the household water line.✓ Close valve 2 ✓ and 3 when using the system.✓

(6)

## 6.4 Determination of reservoirs capacity in litres.

$$\begin{aligned} \text{Capacity} &= \text{content} \times \text{time} \checkmark \\ &= 400 \text{ litres} \times 25 \text{ minutes} \checkmark \\ &= 10\,000 \checkmark \text{ litres} \checkmark \end{aligned}$$

(4)

## 6.5 Matching of communication devices:

6.5.1	B✓
6.5.2	C✓
6.5.3	A✓

(3)

[30]

**TOTAL SECTION B: 160**  
**GRAND TOTAL: 200**