



# basic education

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

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 12**

**AGRICULTURAL TECHNOLOGY**

**FEBRUARY/MARCH 2018**

**MARKING GUIDELINES**

**MARKS: 200**

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

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

|                         |        |  |               |
|-------------------------|--------|--|---------------|
| 1.1                     | 1.1.1  | C✓✓  | (2)           |
|                         | 1.1.2  | A✓✓  | (2)           |
|                         | 1.1.3  | C✓✓  | (2)           |
|                         | 1.1.4  | C✓✓  | (2)           |
|                         | 1.1.5  | B✓✓  | (2)           |
|                         | 1.1.6  | C✓✓  | (2)           |
|                         | 1.1.7  | B✓✓  | (2)           |
|                         | 1.1.8  | A✓✓  | (2)           |
|                         | 1.1.9  | C✓✓  | (2)           |
|                         | 1.1.10 | A✓✓  | (2)           |
|                         |        |  | (10 x 2) (20) |
| 1.2                     | 1.2.1  | cell phones✓✓                                  | (2)           |
|                         | 1.2.2  | flat belt✓✓                                    | (2)           |
|                         | 1.2.3  | methanol✓✓                                     | (2)           |
|                         | 1.2.4  | weaker✓✓                                       | (2)           |
|                         | 1.2.5  | Carbon-dioxide (CO <sub>2</sub> )/dry powder✓✓ | (2)           |
|                         |        |  | (5 x 2) (10)  |
| 1.3                     | 1.3.1  | B✓✓  | (2)           |
|                         | 1.3.2  | E✓✓  | (2)           |
|                         | 1.3.3  | A✓✓  | (2)           |
|                         | 1.3.4  | D✓✓  | (2)           |
|                         | 1.3.5  | C✓✓  | (2)           |
|                         |        |  | (5 x 2) (10)  |
| <b>TOTAL SECTION A:</b> |        |  | <b>40</b>     |

**SECTION B****QUESTION 2: MATERIALS AND STRUCTURES****2.1 FOUR safety properties of insulation material**

- Must not be harmful or dangerous to people when inhaled or touched.✓
  - Should not burn easily.✓
  - Rodents and insects must not be able to eat it or build their nests in it (treated with an anti pest agent).✓
  - Should be light.✓
- (4)

**2.2 2.2.1 TWO measures of ensuring that humans do not accidentally come into contact with an electric fence.**

- Place safety signs on the fence and gates.✓
  - Don't erect near or across pathways.✓
- (2)

**2.2.2 Reasons for using ceramic insulators between the wire and the post of an electric fence.**

- It is not a conductor of electricity.✓
  - Weather resistance/Strong/Durable.✓
- (2)

**2.2.3 Function of the appliances shown in the picture.**

- It applies tension on the wire of an electric fence.✓
  - When the fence wire loses its tension it is not necessary to loosen the wire, it can be wind up with this appliance.✓
- (2)

**2.2.4 Description of what will happen to a person when he/she touches an electric fence if the amperage is too high.**

The result of too high amperage will be that a person will sustain a lethal shock that can cause tissue damage✓ or heart failure.✓

(2)

**2.2.5 TWO types of batteries that can be used as a power source for an electric fence energizer.**

- 12v dry disposable battery✓
  - 12v wet rechargeable battery✓
- (2)

**2.2.6 Factors that have an influence on the earth return cycle of an electric fence.**

- There must be a return path through the ground and an earth spike back to the energizer in order to complete the loop.✓
  - The animal is the missing link that completes the loop.✓
  - Vegetation will also complete the loop causing the output voltage of the energizer to drop.✓
  - Therefore it is very important to keep any growth on the line to a minimum to ensure the animal receives the maximum shock from the energizer.✓
- (4)

**2.2.7 THREE ways of increasing the earth efficiency for particularly poor earth conditions like very dry soil.**

- Increasing the number of earth spikes.✓
  - Run an earth return wire in parallel to the fence line and connecting it to earth spikes at regular intervals.✓
  - Using copper plates in the ground.✓
- (3)

**2.3 FOUR uses of Teflon on a farm.**

- |                                     |                            |
|-------------------------------------|----------------------------|
| • Automobile wiper blades✓          | • Car wash products✓       |
| • Carpet or fabric protector✓       | • O-Rings✓                 |
| • All-weather clothing✓             | • Oil and water seals✓     |
| • Coating for eyeglass lenses✓      | • Teflon Taps and fitting✓ |
| • Magazines for guns✓               | • Non-return valves✓       |
| • Teflon coated cooking pans✓       | • Flanges✓                 |
| • Teflon tape for sealing fittings✓ | • Pipe saddles✓            |
- (Any 4)
- (4)

**2.4 THREE different applications of Vesconite on farm implements.**

- Bushes✓
  - Solid rods✓
  - Wear plates✓
- (3)

**2.5 Bronze used to manufacture propellers of huge ships.**

- Ships spend all their life in seawater that is highly corrodible.✓
  - Bronze is the most cost effective metal because of its resistance against corrosion by seawater.✓
- (2)

**2.6 FIVE influences that manganese have on stainless steel.**

- It combats corrosion.✓
- Gives steel a coarser structure.✓
- Changes the band structure, at the same time causing a reduction in striking strength.✓
- Increases tensile strength.✓
- Reduces the critical cooling tempo and by doing so improves hardening.✓
- Increases resistance against wear.✓
- Reduces magnetism.✓

(Any 5)

(5)  
**[35]**

**QUESTION 3: ENERGY**

- 3.1 3.1.1 FIVE different types of renewable energy sources used by modern society.**
- Solar energy✓
  - Wind energy✓
  - Hydro energy✓
  - Geothermal energy✓
  - Bio energy✓
  - Tidal energy✓
- (Any 5) (5)
- 3.1.2 The geothermal source protection from cooling down too much.**
- Do not pump too much cold water into the hole✓ (1)
- 3.2 3.2.1 Factors that have a negative influence on the effectiveness of a solar energy cell.**
- Climate, weather patterns✓
  - High levels of pollution✓
  - Sun energy is not available during the night time✓
  - A cloudy day makes this energy source ineffective✓
- (4)
- 3.2.2 TWO types of energy that are directly generated from solar energy.**
- Heat✓
  - Electricity✓
- (2)
- 3.2.3 A device used with solar panels that change direct current to alternating current.**
- Inverter✓/transformer✓ (Any 1) (1)
- 3.3 3.3.1 TWO actions to prevent the blades from being damaged when they turns too fast during a strong wind storm.**
- Change the pitch of the blades✓
  - Apply the brakes✓
- (2)

**3.3.2 FIVE advantages of a small wind energy system to the farmer.**

- Decades of free electricity after initial-cost recovery.✓
- Increased property values.✓
- Reliable electricity.✓
- Relief from high and volatile prices of other forms of electricity.✓
- Personal energy independence.✓
- Ability to support clean energy and reduce global warming.✓

(Any 5)

(5)

**[20]**

**QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES****4.1 4.1.1 THREE of the most possible causes of poor penetration during MIG welding.**

- Current too low✓
- Preparation too narrow✓
- Root face too large✓
- Root gap too small✓
- Worn contact tip causing irregular arc✓
- Incorrect alignment of plates✓

(Any 3)

(3)

**4.1.2 Reason why it is not necessary to use additional flux when MIG welding.**

The shielding gas (CO<sub>2</sub>) replaces the flux✓

(1)

**4.1.3 TWO reasons why MIG welding is quicker than conventional arc welding.**

- Rod is not changed regularly✓
- Flux does not have to be removed✓

(2)

**4.1.4 Type of material used for manufacturing suitable protective clothing for welding.**

Cotton✓

(1)

**4.1.5 A reason for your answer in QUESTION 4.1.4**

Other synthetic materials melt when exposed to heat/cotton does not melt when exposed to heat✓

(1)

**4.1.6 Explanation of why a little metal ball occurs on the tip of your MIG welding torch.**

- The gap between the welding tip and the work piece is too small.✓
- You are building up too much heat because the current setting is too high.✓

(2)

**4.1.7 TWO ways of clearing the metal ball from the tip of the MIG welding torch.**

- Use pliers to remove the blob of welding from the nozzle.✓
- Use a file or small grinder to remove the blob.✓
- In severe cases, replace the nozzle.✓

(Any 2)

(2)

**4.1.8 TWO different metals that can successfully be welded with a MIG welding machine.**

- High alloy steel (stainless alloys)✓
  - Aluminium✓
  - Mild steel✓
- (Any 2)

(2)

**4.2 Explanation on how you will achieve a neat final welded joint with the angle grinder.**

- Use a grinding wheel on the angle grinder.✓
- Be careful as you approach the surface of the original stock. You don't want to grind through your nice new weld.✓
- Move the angle grinder around like you would a sander so as not to heat up, or grind away any one spot of the metal too much.✓
- If you see the metal get a blue colour to it you are either pushing too hard with the grinder or not moving the grinding wheel around enough.✓
- Wear a full face mask when grinding, a mask or respirator, and ear protection.✓

(5)

**4.3 The overhead arc welding procedure.**

- Use an arc as short as possible.✓
  - Weld a number of runs without any lateral movement.✓
  - When molten metal starts dripping, the amperage should be reduced slightly.✓
  - Move electrode slightly faster.✓
  - Hold electrode in same position as in relation to base metal.✓
- (Any 4)

(4)

**4.4 4.4.1 A device that can be used to light the flame of an oxy-acetylene torch.**

Always light the oxyacetylene torch with the striker.✓

(1)

**4.4.2 Explanation of why it is NOT advisable to use a cigarette lighter or matches when igniting the oxyacetylene torch.**

A cigarette lighter or match would put your hand too close to the ignition tip.✓

(1)

**4.4.3 The procedure that must be followed to shut down the oxy-acetylene equipment after welding is finished.**

- Turn off the acetylene valve on the torch handle.✓
- Turn off the oxygen valve on the torch handle.✓
- Turn the main cylinder valve clockwise on the top of both gas cylinders.✓
- Now open the two valves on the torch handle to 'bleed' the system.✓
- Turn both the oxygen and acetylene regulator handles counter-clockwise until they are loose.✓
- Close both valves on the torch handle.

(Any 5)

(5)

**4.5 Explanation of how to deal with hazardous gasses when using a plasma cutting torch.**

- Under no circumstances inhale these gases.✓
- If you must inspect a piece as you cut it, view the piece from the side, not from above. This will minimize your exposure to hazardous gas.✓
- Make sure the work area is well-ventilated as well.✓
- An exhaust hood or a space open to the outside is recommended when using a plasma torch.✓
- Respirators or other breathing apparatus may be required.✓

(5)  
**[35]**

**QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT****5.1 5.1.1 Identify component A.**

Auger✓ (1)

**5.1.2 The function of the ram.**

The hay is compressed in the baling chamber by the ram✓ with a forward backward movement.✓ (2)

**5.1.3 TWO functions of the slip clutch found in the drive mechanism of a baling machine.**

- To prevent heavy objects from being taken into the baler.✓
  - To protect the pick-up if it is impeded by anything.✓
  - To protect the auger if it becomes overloaded.✓
- (Any 2) (2)

**5.1.4 FIVE procedures that must be followed before the baler is stored for a long period.**

- 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 5) (5)

**5.2 Reason why it is necessary to make use of a four-wheel drive tractor with a front-end loader mechanism, to move large round bales.**

The front suspension and wheels are stronger to carry the weight of the bales.✓ (1)

**5.3 5.3.1 Calculation of the diameter of pulley A on the pump.**

$$N_a \times D_a = N_g \times D_g$$

$$\text{Diameter of Driven pulley } D_g = \frac{3\,750 \times 200}{2\,000} \checkmark$$

$$D_g = 375 \checkmark \text{ mm} \checkmark \quad (4)$$

**5.3.2 FOUR advantages of V-belts.**

- V-belts do not easily slip off pulleys.✓
  - V-belts draw tighter round pulleys when tension increases.✓
  - Lubrication is never necessary.✓
  - V-belts are relatively strong, and under normal circumstances do not easily break.✓
  - Cold, moist conditions, age or use do not cause V-belts to stretch or shrink.✓
  - V-belts last longer than flat belts.✓
- (Any 4) (4)

**5.4 5.4.1 Meaning of illustration of arrow A.**

The illustration shows how the plough✓ tends to push down the front wheels✓ when a top link✓ is fitted between the plough and tractor. (3)

**5.4.2 THREE ways a farmer could make use of to change a tractor's mass displacement positively.**

- Decrease the tow bar pulling force✓
  - Lower the tow bar✓
  - Increase the wheelbase✓
- (3)

**5.4.3 THREE factors that have an influence on the forward movement of the tractor when ploughing.**

- Ploughing depth✓
  - Soil resistance✓
  - Forward speed of the tractor✓
- (3)

**5.5 The reason why a differential is installed in the rear axle of a tractor.**

- Changing direction of rotation✓
  - Speed reduction✓
  - Dividing rotation equal between the rear wheels✓
  - Increase torque✓
- (Any 3) (3)

**5.6 FOUR causes of tractor that overturns.**

- Cornering at high speed.✓
  - Driving off the shoulder of roads.✓
  - Working on a steep ditch, hill or washout.✓
  - Carrying loads too high in the front-end loader.✓
  - Hitching too high when pulling heavy loads.✓
  - Towing loads downhill too fast and/or without sufficient brakes.✓
  - Sliding off loading ramps.✓
  - The load on the trailer more than 75% of the tractors weight.✓
- (Any 4) (4)

**5.7 TWO places where the sensitivity element can be installed on a tractor.**

- Where the top link is fitted✓
  - In the differential housing✓
  - At the base of the lifting arms✓
- (Any 2)

(2)

**5.8 The medium that is used to drive each tool.**

- A Air ✓
- B Oil✓
- C Electricity✓

(3)

**[40]**

**QUESTION 6: WATER MANAGEMENT****6.1 FOUR types of filtering systems used to purify water for human consumption and describe the working of each.**

- Distillers' purification system✓
  - They work with a boiling water/evaporation system.✓
- Reverse Osmoses purification system✓
  - It works through a liquid system and through a membrane very slowly in molecule level.✓
- Whole house purification system✓
  - Use cartridges to filter water.✓
- Faucet water filters✓
  - Installed in the kitchen and cleaned water as needed.✓
- Jug /Pitcher filters
  - The water will go in at the top and slowly filter down and finally captured at the bottom in a reservoir.

(Any 4 x 2)

(8)

**6.2 Meaning of abbreviation 'GIS' and the use of it in a modern farming enterprise.**

- GIS : Geographical Information System✓
  - Remote sensing image data from the soil and crops is processed and then added to the GIS database.✓
  - This data is analysed and interpreted.✓
  - Problem areas or areas of under production in fields are identified.✓
  - The problem areas can then be rectified by adding extra water or fertilizers.✓

(5)

**6.3 Reasons for determining the flow rate of water in an irrigation system.**

- To ensure the correct calibration of the sprayers.✓
- Effective scheduling of irrigation.✓
- To prevent the over utilization of the water source.✓
- To use water economically.✓

(Any 2)

(2)

**6.4 6.4.1 The most important substance that is found in any septic drain that ensures that it will function properly.**

Bacteria✓

(1)

**6.4.2 The function of the distribution box of a septic drain.**

- Serves to distribute the flow from the septic tank overflow evenly to the absorption field or seepage pits.✓
- It is important that each trench or pit receive an equal amount of flow.✓
- This prevents overloading of one part of the system.✓

(3)

**6.4.3 THREE places where a septic drain should not be build.**

- Near boreholes or drinking water installations.✓
  - Near the farmhouse.✓
  - Near traffic.✓
  - Where people usually eat, wash or work regularly.✓
- (Any 3)

(3)

**6.5 6.5.1 The use of the irrigation timer.**

- This device controls the watering through different irrigation lines.✓
- This device can start and stop the irrigation system.✓

(2)

**6.5.2 TWO basic types of irrigation timers that can be used on a farm.**

- Mechanical timers✓
- Electronic timers✓

(2)

**6.5.3 FOUR different types of irrigation systems.**

- Overhead irrigation systems✓
  - Centre pivot irrigation systems✓
  - Sprinkler irrigation✓
  - Travel irrigation system✓
  - Wheel line irrigation system✓
- (Any 4)

(4)

**[30]****TOTAL SECTION B: 160**  
**GRAND TOTAL: 200**