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_2)/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)

TOTAL SECTION A: 40

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 accidently 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✓
- Carpet or fabric protector✓
- All-weather clothing✓
- Coating for eyeglass lenses✓
- Magazines for guns✓
- Teflon coated cooking pans✓
- Teflon tape for sealing fittings✓
- Car wash products✓
- O-Rings✓
- Oil and water seals✓
- Teflon Taps and fitting✓
- Non-return valves✓
- Flanges✓
- 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✓ (1)
(Any 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_2) 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.

$Na \times Da = Ng \times Dg$

Diameter of Driven pulley $Dg = \frac{3\,750 \times 200}{2\,000}$✓✓

$Dg = 375$✓ mm✓ (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)

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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)

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TOTAL SECTION B: 160
GRAND TOTAL: 200