



# basic education

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

## **SENIOR CERTIFICATE EXAMINATIONS**

**AGRICULTURAL TECHNOLOGY**

**2018**

**MARKING GUIDELINES**

**MARKS: 200**

**These marking guidelines consist of 16 pages.**

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

1.1	1.1.1	C✓✓	(2)
	1.1.2	D✓✓	(2)
	1.1.3	B✓✓	(2)
	1.1.4	B✓✓	(2)
	1.1.5	C✓✓	(2)
	1.1.6	D✓✓	(2)
	1.1.7	A✓✓	(2)
	1.1.8	B✓✓	(2)
	1.1.9	C✓✓	(2)
	1.1.10	D✓✓	(2)
			(10 x 2) (20)
1.2	1.2.1	yellow✓✓	(2)
	1.2.2	cell phone/two way radio✓✓	(2)
	1.2.3	smart controller✓✓	(2)
	1.2.4	oil✓✓	(2)
	1.2.5	zinc✓✓	(2)
			(5 x 2) (10)
1.3	1.3.1	D✓✓	(2)
	1.3.2	G✓✓	(2)
	1.3.3	A✓✓	(2)
	1.3.4	B✓✓	(2)
	1.3.5	E✓✓	(2)
			(5 x 2) (10)

**TOTAL SECTION A: 40**

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

2.1 The alloy metal that is specifically used to manufacture the following products and TWO reasons why that metal is used.

**2.1.1 Milk tanks**

- Stainless Steel✓ (1)
- Resistant to air, water and many chemical acids and alkali.✓
  - Resistance against corrosion.✓
  - Can be welded well.✓ (Any 2) (2)

**2.1.2 Fittings for hot water copper pipes**

- Brass✓ (1)
- Strength✓
  - Machinability✓
  - Wear resistance✓
  - Hardness✓
  - Corrosion resistance✓ (Any 2) (2)

**2.1.3 Hammering tools that can be used in explosive atmospheres.**

- Bronze(Beryllium Copper)✓ (1)
- Does not generate sparks✓
  - Low friction✓
  - Resist corrosion✓ (Any 2) (2)

2.2 TWO hot working processes that can be used to change the structural properties of brass.

- Annealing✓
- Stress relieving✓
- Tempering✓ (Any 2) (2)

2.3 2.3.1 TWO reasons for preferring fibre-glass troughs instead of concrete troughs for cattle.

- Easy to move around. (Light)✓
- Easy to fix/repair✓
- Rust resistance✓ (Any 2) (2)

**2.3.2 Description of 'resin' as used in the manufacturing in fibreglass products.**

They are low viscosity fluids✓that can be transformed✓to tough flexible solids by adding✓a hardening agent.

(Any 2) (2)

**2.3.3 TWO methods used to join fibreglass parts.**

- Pop rivet✓
- Bolt and nut✓
- Fibreglass✓

(Any 2) (2)

**2.4 FIVE reasons why Vesconite is proven as the best material in the manufacture of bushes.**

- It is ideal for many marine applications.✓
- It does not swell and seize.✓
- It remains hard.✓
- It does not delaminate.✓
- It has low friction.✓
- It does not corrode.✓
- Bushes can easy be removed.✓
- Does not contain any asbestos (healthy)✓/Safer to work with.
- Easy to machine.✓

(Any 5) (5)

**2.5 Description of how an adhesive should be applied to a surface to ensure sufficient cohesion.**

- First clean the surface properly.✓
- If the surface is very slippery, the surface can be sanded to make it coarse.✓
- Apply a thin base coat if the surface is very porous.✓
- Apply only a thin layer of adhesive because a thick layer of adhesive will result in a weak joint.✓
- Apply adhesive to both surfaces.✓

(Any 4) (4)

**2.6 2.6.1 The procedure that must be followed when testing the earth system of an electric fence.**

- Firstly short out the live fence line to the ground.✓
- Switch the energizer ON.✓
- Measure the voltage between the GROUND and the Earth Spike with a meter.✓
- If this is above 200 volts the earth installation is inefficient.✓

(4)

**2.6.2 TWO examples of the application of electric fences on the farm.**

- Protection✓/Farm security purposes.
- Temporary fences.✓
- Fencing dangerous animals.✓

(Any 2) (2)

**2.6.3 THREE alternative energy sources that can be used to provide energy for an electrical fence.**

- Wind✓
- Solar✓
- Water✓

(3)

**[35]**

**QUESTION 3: ENERGY****3.1 The TWO parts labelled as A and B of the turbine, and the function of each.**

A	Propeller-type blades✓	Shaped to catch the wind, transfer wind energy into drive/kinetic/rotational energy.✓	(2)
B	Generator✓	Generates electricity and send it to the transformer and electric grid.✓	(2)

**3.2 3.2.1 The working of the solar hot water geyser.**

- The sun heats the water in the glass tubes, the heated water rise to the highest point in the system.✓
- The heated water enters the geyser through a closed copper pipe network that runs through the geyser.✓
- The hot water inside the copper pipes heats up the cold water inside the geyser.✓
- The cooled water flows downwards back to the solar tubes where it is reheated.✓

**3.2.2 FOUR benefits of using solar energy to heat water.**

- Environmentally friendly energy source/No pollution.✓
  - Installation is relative cheap and simple.✓
  - Solar power is limitless.✓
  - Transition losses are limited.✓
  - Does not use a lot of space.✓
- (Any 4) (4)

**3.3 3.3.1 TWO geological aspects that should be investigated to determine the specific area to construct a geothermal energy plant.**

- Rocks that is soft enough to drill✓/Type of rock
  - Volcanic activities✓
  - Accessibility✓
- (Any 2) (2)

**3.3.2 TWO advantages of a geothermal energy plant.**

- A geothermal system does not create any pollution.✓
  - The cost of the land to build a geothermal power plant on is usually less.✓
  - Because geothermal energy is very clean, you may receive tax cuts, and/or no environmental bills.✓
  - No fuel is used to generate the power.✓
  - The running costs for the plants are very low.✓
  - The overall financial impact of these plants is positive.✓
- (Any 2) (2)

**3.4 3.4.1 TWO alternative fuels that are obtained from plants.**

- Ethanol✓
- Methanol✓
- Biodiesel✓

(Any 2) (2)

**3.4.2 TWO crops that can be used to produce bio-fuel.**

- Sugar cane✓
- Sunflower✓
- Maize✓
- Vegetables✓
- Sorghum✓

(Any 2) (2)  
**[20]**

**QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES****4.1 4.1.1 The origin and purpose of the cloud formed around a welding area.**

- The inserted gas✓is fed through the pipe and nozzle and exit through the holes in the nozzle.
  - The function is to shield the molten puddle✓from oxygen contamination.✓
- (3)

**4.1.2 The procedure that must be followed when the feed wire burns onto the copper welding tip.**

- Release the trigger.✓
  - Take a plier and cut the blob from the welding tip.✓
  - Use a file and file the welding tip.✓
  - Ensure that the feeding wire is separated from the tip and continue welding.✓
- (4)

**4.1.3 TWO circumstances that can cause the feed wire from melting onto the welding tip.**

- Gap between the nozzle and work piece is too small.✓
  - Wire feed is too slow.✓
  - Welding too close to your material.✓
  - Building up too much heat on the tip of the welding torch.✓
- (Any 2) (2)

**4.1.4 THREE causes of cracks forming on the welding bead when performing MIG welding.**

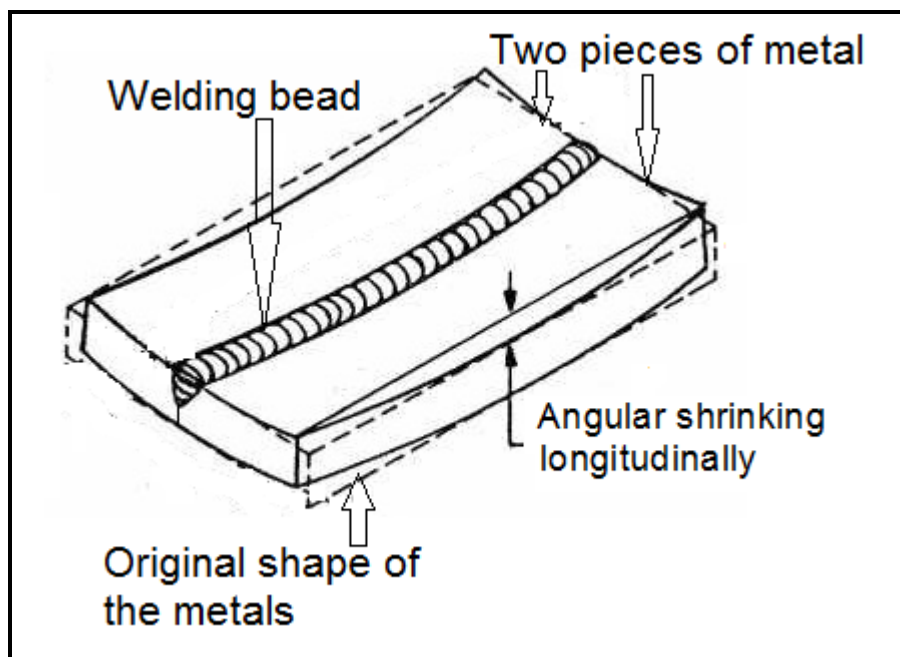
- Root gap too small in restrained joint.✓
  - Current too high.✓
  - Deep narrow weld bead. ✓(with centre line cracking)
  - Inadequate filling of crater.✓
  - Inadequate pre-heat on high tensile and low alloys.✓
  - Incorrect composition of electrode.✓
- (Any 3) (3)

**4.2 4.2.1 Description of 'shrinking' as it occurs in a welding joint.**

- When metal is heated it expands and when cooling down it shrink.✓
  - The shrinking of welded metal and weld runs cause distortion of metal when they cool down.✓
  - Shrinking take place in all directions simultaneously and therefore cause various kinds of distortion.✓
- (3)



- 4.2.2 A free hand drawing to illustrate angular shrinking longitudinally on a welded project. The dimensions of the two flat bar pieces that must be welded together is 50 mm x 10 mm x 100 mm.**



- Two pieces of metal ✓ (1)
- Welding bead ✓ (1)
- Shrinking ✓ (1)
- Original shape of the metals ✓ (1)

- 4.2.3 Prevention of metal distortion when welding on metal.**

- Pre-setting ✓
  - Welding of patch work ✓
  - Clamping ✓
  - Spot welding ✓
- (Any 2) (2)

- 4.3 4.3.1 Reasons why sunglasses are not recommended when cutting with the oxy-acetylene set.**

- They do not filter the ultraviolet light effectively. ✓
- Sunglasses will not protect your eyes sufficiently from flying sparks. ✓ (2)

- 4.3.2 The possible end results for the gas cylinder when it accidentally topples over.**

- The main valve may break off. ✓
- The cylinder will turn into a missile and cause extreme damage. ✓ (explodes) (2)

**4.3.3 TWO types of metals that can be cut with an oxy-acetylene welding set.**

- Mild steel✓
- Carbon steel✓
- Cast iron✓
- Stainless steel✓

(Any 2) (2)

**4.4 Technical advice to a farmer who wants to purchase a plasma cutting machine for general use on the farm.**

- Buy a machine according to the thickness of the metal that must be cut.✓
- You need a compressor large enough for the required working pressure✓
- Buy a well-known brand/quality.✓

(Any 2) (2)

**4.5 FOUR pieces of personal protective equipment (PPE) that must be used when doing plasma cutting.**

- Fireproof gloves✓
- Face shield✓
- Flame resistant clothing✓
- Leather shoes✓

(4)

**4.6 Factors that cause poor cutting performance when using the plasma cutting machine.**

- The working pressure of the machine is too low.✓
- A too small compressor that provides insufficient air pressure.✓
- Water in the air system.✓
- Electrode and tip are worn.✓
- Use of a too thin air hose.✓
- Blocked air filters.✓

(Any 2) (2)

**[35]**

**QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT****5.1 5.1.1 TWO disadvantages of mechanization on the farm.**

- High initial input cost✓
- Higher salaries✓
- Skilled labourers are needed✓
- Labour regulations✓
- Loss of jobs✓

(Any 2) (2)

**5.1.2 TWO examples of fixed capital on the farm.**

- Land✓
- Buildings✓
- Kraals✓
- Boreholes✓
- Pumps✓

(Any 2) (2)

**5.2 TWO functions of a shear bolt used in the drive system of a baling machine.**

- Prevents heavy objects from being taken into the baler.✓
- Protects the pick-up if it is impeded by anything.✓
- Protects the auger if it becomes overloaded.✓

(Any 2) (2)

**5.3 THREE parts of a clutch assembly A, B and C.**

A = Pressure plate✓  
B = Release bearing✓  
C = Clutch plate✓

(3)

**5.4 Is it possible that a vehicle can turn around a bend if the differential is locked? Explain your answer.**

- No✓
- When the vehicle turn around a bend the wheels will momentarily turn around a common centre,✓
- but when the differential is locked this cannot happen because the half axle shaft of the outer wheel cannot revolve faster than that of the inner wheel.✓

(3)

**5.5 TWO advantages of using a bearing in a drive system.**

- Bearings increase efficiency.✓
- Bearings reduce friction and wear.✓
- Allows extended use at high speeds.✓
- Avoids overheating and premature failure of a drive system.✓

(Any 2) (2)

**5.6 TWO advantages of thermoplastic universal joints.**

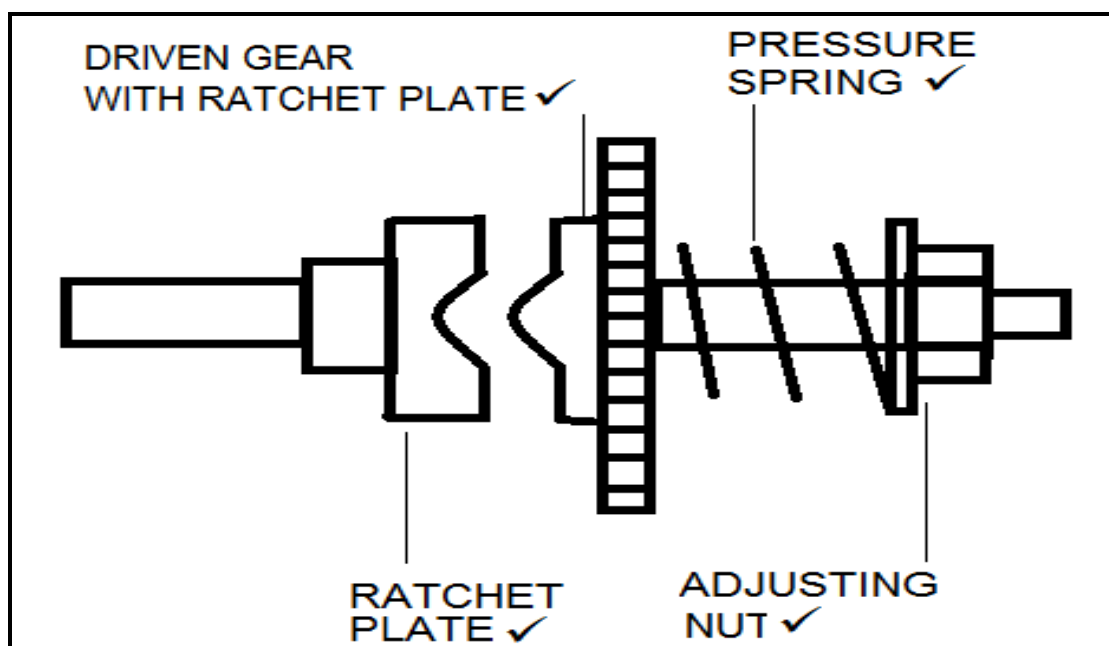
- They are light weight✓
- They have negligible backlash✓
- Are corrosion resistant✓
- They have the capability for high-speed operation✓
- They are self-lubricating✓
- Does not delaminate or soften✓
- Easy removable✓
- Easy to machine✓
- Does not swell or seize✓

(Any 2) (2)

**5.7 Freehand drawing of a ratchet type slip clutch and indicating of the following components.**

- Ratchet plate
- Pressure spring
- Driven gear with ratchet plate
- Adjusting nut

(1)  
(1)  
(1)  
(1)



(4)

**5.8 Reasons why it is better moving heavy loads with a rear attachments rather than with the front-end loader.**

- Rear tyres are better suited/stronger to carry the extra weight.✓
- There is less chance of side overturns because the bale is not lifted high.✓
- More stress on the front wheels causes difficult steering.✓

(Any 2) (2)

**5.9 The situation in case the top link between a tractor and plough are removed when ploughing.**

The back of the plough will tend to lift up out of the soil✓or the nose of the tractor will tend to lift up.✓

(2)

**5.10 Parts where a quick coupling can be connected to a tractor.**

- Two lifting arms✓
- Top link✓

(2)

**5.11 THREE systems on a combine harvester that must be set to prevent the loss of cornels during harvesting.**

- The pickup system must be set correctly.✓
- Set the drum speed correctly.✓
- Sieves must be set correctly.✓
- Gears/pulleys.✓

(Any 3) (3)

**5.12 THREE aspects to consider in order to prevent a hammer mill from vibrating.**

- Hammers should be checked to ensure that their mass is the same.✓
- When replacing hammers, the whole set of hammers should be replaced at the same time.✓
- Hammers that are reversed should be replaced in its original place.✓
- Nothing should be added or removed from the rotor.✓
- Run the hammer mill at the correct speed.✓
- The hammer mill must be properly anchored.✓

(Any 3) (3)

**5.13 TWO places on a tractor where the automatic depth control mechanism can be installed.**

- Where the top link is fitted.✓
- In the differential housing.✓
- At the base of the lifting arms.✓

(Any 2) (2)

**5.14 THREE advantages of transmission oil in tractor hydraulic systems.**

- Not compressible✓
- Good lubrication qualities✓
- Remains liquid over a large temperature range✓
- Not volatile✓
- Relatively cheap✓
- Easily conductible in pipes✓
- Flows through filters, pipes, oil pumps and cylinders with ease✓
- Contains detergents that keeps parts clean✓
- Contains anti-foam detergent✓
- Good cooling qualities✓

(Any 3) (3)

- 5.15 A diesel tank with a surface area of 9 m<sup>2</sup> needs to be painted. Use a corrosion resistant paint with a covering capability of 3 m<sup>2</sup> per litre. Determine how much paint is required by showing all calculations, if TWO coats of paint are required on the tank.**

Paint required =  $9 \text{ m}^2 / 3 \text{ m}^2$  (covering capability per litre)✓  
= 3 litres needed  
= 2 coats X 3 litres per coat✓  
= 6 litres of paint✓

(3)  
[40]

**QUESTION 6: WATER MANAGEMENT****6.1 Completion of the table regarding different irrigation systems.**

- 6.1.1 Centre pivot irrigation✓ (1)
- 6.1.2 PVC pipes with plastic or brass sprinklers✓ (1)
- 6.1.3 Sprinklers can irrigate areas such as small farms, parks and pastures✓ (1)
- 6.1.4 Lateral wheel line irrigation✓ (1)

**6.2 FOUR disadvantages of flood irrigation. (4)**

- When water supply is weak flood irrigation is impossible.✓
  - Surface gradient (steep) leads to erosion.✓
  - Infiltration tempo not constant.✓
  - Drainage problems.✓
  - High costs of levelling of land.✓
  - Increase salinity in soil.✓
- (4)

(Any 4)

**6.3 The functions of the following irrigation system parts.**

- 6.3.1 Sand filter** Prevent blockage of sprinkler nozzles / filters the water.✓ (1)
- 6.3.2 Sprinkler** Provide water to plants.✓ (1)
- 6.3.3 Pump** Provide water to the system / sprinklers.✓ (1)
- 6.3.4 Solenoid valve** Controlling the water flowing through the system.✓ (1)
- 6.3.5 One way valve** Prevent water from flowing back to the pipe.✓ (1)

**6.4 6.4.1 TWO devices, A and B.**

- A Tensio meter✓
- B Evaporation pan/Class – A pan✓ (2)

**6.4.2 The main purpose of the devices shown.**

- To determine the water evaporation rate in a specific field.✓ (1)

**6.5 TWO devices that are used to control garden watering systems.**

- Electronic irrigation timer✓
  - Mechanical timer✓
- (2)

**6.6 Operation of a septic tank system.**

- Sewage is broken down by anaerobic bacteria in the first tank.✓
  - Very little solids remain when the watery sewerage flows to the second tank.✓
  - Only liquid sewage remains and drains away through the outlet pipe or stone trench.✓
- (3)

**6.7 THREE points to consider when choosing a suitable location for installing a septic tank.**

- The tank should not be built near boreholes and drinking water installations.✓ (water source)
  - A suitable distance away from the house.✓
  - Not near traffic.✓
  - Not near where people eat, wash or work regularly.✓
- (Any 3) (3)

**6.8 The operation of a pipe drainage system.**

The water drains through the surface gravel✓ and seeps into the pipe's perforations✓ before traveling out the end of the pipe into an area that can accommodate extra water.✓

(3)

**6.9 THREE types of water purification systems that make use of a membrane to purify household water.**

- Reverse osmosis✓
  - Faucet filters✓
  - Jug or pitched filter✓
  - Inline filter✓
  - Whole house purification system✓
- (Any 3) (3)
- [30]**

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