



# education

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Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**AGRICULTURAL TECHNOLOGY**

**FEBRUARY/MARCH 2010**

**MEMORANDUM**

**MARKS: 200**

**This memorandum consists of 10 pages.**

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

- 1.1 B ✓✓
- 1.2 A ✓✓
- 1.3 A ✓✓
- 1.4 B ✓✓
- 1.5 B ✓✓
- 1.6 B ✓✓
- 1.7 A ✓✓
- 1.8 C ✓✓
- 1.9 C ✓✓
- 1.10 C ✓✓
- 1.11 C ✓✓
- 1.12 B ✓✓
- 1.13 A ✓✓
- 1.14 C ✓✓
- 1.15 A ✓✓
- 1.16 B ✓✓
- 1.17 B ✓✓
- 1.18 C ✓✓
- 1.19 B ✓✓
- 1.20 C ✓✓

**(20x2=40)****TOTAL SECTION A: 40**

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

2.1 2.1.1

Qualities	Stainless steel	Mild steel
(a) Weld ability	Very good, if the correct welding rods are used. ✓	Very good. ✓
(b) Malleability	Reshapes with difficulty even at very high temperatures. ✓	Very good. ✓
(c) Corrosion resistance	Very good. ✓	Poor. Rusts easily. ✓
(d) Durability	Very durable. Does not easily bend or fracture. ✓	Poor. Bends easily and wears quickly. ✓
(e) Affordability	Relatively expensive. Lasts long and has many good qualities. ✓	Cheaper to manufacture but because of its low corrosion resistance and low resistance to wear, it is not suitable for certain uses. ✓

(10)

- 2.1.2
- Increases resistance against corrosion. ✓
  - Promotes the hardening of steel. ✓
  - Improves strength. ✓
  - Improves resistance to the formation of scale. ✓
  - Improves tensile strength. ✓
  - Decreases magnetism.
  - Most chromium steels can be welded well. (Any 5) (5)

2.2 2.2.1 Heat resistance (temperature).

The adhesive itself should not distort, melt or burn when heated. ✓  
Some kinds of plastic are extremely heat resistant like Bakelite ✓, and some are not heat resistant like Perspex, which easily changes shape when heated. ✓ (3)

2.2.2 Water-resistance.

When used in humid conditions, a water resistant adhesive should be used to make a joint ✓ e.g. silicon. ✓ (2)

- 2.3
- Extend in a straight line. ✓
  - Sturdy corner and straining posts. ✓
  - Posts upright. ✓
  - Straining posts not far from one another. ✓
  - Strands firmly attached to line posts by means of isolators. ✓
  - Posts and wires should be spaced equally. ✓
  - Do not use inferior material. ✓
- (7)
- 2.4
- 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)
- 2.5
- Pressure should be high enough to satisfy needs. ✓
  - Prevent spillage. ✓
  - Joints should be watertight. ✓
  - Removal of spillage water. ✓
  - Protect all valves.
- (Any 4) (4)
- [35]**

**QUESTION 3: ENERGY**

- 3.1 3.1.1 (a) Heat. ✓ Solar/Sun geyser, Solar cooker. ✓  
(b) Electricity. ✓ Solar cell/ Photo-electric cells. ✓
- (4)
- 3.1.2 (a) Non-polluting. ✓  
(b) Safe. ✓  
(c) Free. ✓  
(d) Abundant. ✓
- (4)
- 3.2 3.2.1 • Sulphuric acid. ✓  
• Distilled water. ✓
- (2)
- 3.2.2 Lead. ✓
- (1)
- 3.2.3 Chemical energy. ✓
- (1)
- 3.2.4 Direct current. ✓
- (1)
- 3.2.5
- Can be charged and discharged. ✓
  - Can produce a high discharge current for a long time. ✓
  - Stores electric energy for a long period. ✓
  - Relatively efficient.
- (Any 3) (3)

- 3.2.6
- Check polarity of accumulator before removing it. ✓
  - Always remove earth terminal first. ✓
  - Clean top of battery with bicarbonate of soda. ✓
  - Scrape inside of battery terminals to remove corroded layer. ✓
  - Check the level of the electrolyte.
  - When reinstalling check the polarity.
  - Attach earth terminal after all the other connections have been connected.
- (Any 4) (4)  
**[20]**

#### QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES

- 4.1 4.1.1 Oil bath welding machine. ✓ (1)
- 4.1.2 One lug is the negative connection point and is stationary. ✓  
The other lug is the positive connection point and can be moved to higher or lower amperage settings. ✓ (2)
- 4.1.3 Transformer oil. ✓ (1)
- 4.1.4 This welding is a process of fusion ✓ in which electrical energy in the form of an arc is used to supply the necessary heat for the metals to fuse. ✓ An electrode is added as a filler rod ✓ and contains the flux that acts as a shield. ✓ (4)
- 4.1.5
- (a) Never work with a welder of which the power supply is not connected to the earth leakage circuit breaker. ✓
  - (b) Never weld when standing in water. ✓
  - (c) Electrode holder must be thoroughly insulated. ✓
  - (d) Keep flammable materials away from flying sparks. ✓
  - (e) A helmet with clear glass must be worn to protect the eyes from flying slag. ✓
  - (f) A visor with dark filter glasses that fits over the clear glasses must be worn to protect the user against ultraviolet rays when welding.
  - (g) It is extremely dangerous to look at flame with uncovered eyes when welding. It can lead to painful arc eyes or even blindness.
  - (h) Caution must be taken when welding any drums. Explosive gasses or substances can lead to explosions.
  - (i) Certain metals such as copper, manganese steel and galvanized metals emit poisonous vapours when welded.
- (Any 5) (5)
- 4.1.6 Bakelite. ✓  
Must not conduct electricity. ✓  
Heat resistant. ✓ (3)



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

- 5.1 5.1.1
- Ensure that all electrical connections are tight. ✓
  - Check for loose wires. ✓
  - Make sure that there is no damage to the extension wire.
  - Check that the earth wire is connected.
  - Switches must work properly.
  - Make sure that the wires are correctly connected inside the 3-point plug. (Any 2) (2)
- 5.1.2
- 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)
- 5.2 5.2.1
- Do not let people or animals come near the blades or working parts of the machine while working. ✓
  - Make sure that all safety devices are in place and in working order. ✓
  - No person other than the driver may ride or climb on top of the machine. ✓ (Any other acceptable answer) (3)
- 5.2.2
- All grease points must be well greased. ✓
  - The correct tension must be set for all belts or chains. ✓
  - Check that all parts are functioning correctly by operating it slowly. ✓
  - Replace all worn parts immediately especially the cutter blades. ✓
  - Service according to manufacturers specifications. ✓
  - Lift up all dust release guards.
  - Check that there is no damage to the blades and that they are sharp. (Any 5) (5)

- 5.3 5.3.1
- Clean the planter, pipes, fertilizer tanks and seed containers properly. ✓
  - Fix broken or damaged parts immediately. ✓
  - Release 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.
  - Paint or cover all unpainted areas with a thin layer of grease.
  - Grease all grease nipples.
  - Store planter in a dry place under cover. (Any 4) (4)
- 5.3.2
- Engine drive needs to be disengaged when gears are changed. ✓
  - Drive should be disengaged when the tractor is started. ✓
  - The clutch is disengaged to allow engine speed to increase and then engaged to give greater torque.
  - Allows the operator to stop the tractor, belt pulley or PTO shaft without stopping the engine. (Any 2) (2)
- 5.4 5.4.1 The operator. ✓ (1)
- 5.4.2
- Not compressible. ✓
  - Good lubrication qualities. ✓
  - Remains liquid over a wide temperature range. ✓
  - Not volatile. ✓
  - Relatively cheap.
  - Easily conductible in pipes.
  - Flows through filters, pipes, oil pumps and cylinders with ease.
  - Contains detergents that keep parts clean. (Any 4) (4)
- 5.4.3
- (a) Further reduction in speed. ✓
  - (b) Higher torque. ✓ (2)
- 5.5 5.5.1
- It has a bale shape mechanism that tightly rolls the hay into a round bale. ✓
  - Baling chamber is initially small but enlarges gradually as the hay is fed into the chamber. ✓
  - A tensioning system of pulleys belts and chains keeps the tension of the bale constant while it is turning around. ✓
  - If the bale is large enough ropes are bounded around the bale and then ejected. ✓ (4)
- 5.5.2 The bale density is determined by the forward speed of the tractor. ✓ (1)
- 5.5.3 Bales can only be handled mechanically. ✓ (1)



5.6	5.6.1	Capsule thermostat (Filled with wax).✓	(1)
	5.6.2	Regulates the temperature inside the engine ✓in order for the temperature in the engine to stay as close as possible to working temperature. ✓	(2)
5.7	5.7.1	Universal joint. ✓	(1)
	5.7.2	To grease the joints regularly.✓	(1)
	5.7.3	(a) Strong. ✓ (b) Not become loose. ✓ (c) Weight saving. (d) Must provide adequate/efficient protection.	(Any 2) (2)
			<b>[40]</b>

**QUESTION 6: WATER MANAGEMENT**

6.1	6.1.1	Dripper.✓	(1)
	6.1.2	To clear the water of any impurities/solids.✓	(1)
	6.1.3	To let the air out of the main line in order for the farmer to have a constant flow of water✓	(1)
	6.1.4	PVC✓	(1)
6.2	6.2.1	Centrifugal pump. ✓ Submergible pump.✓	(2)
	6.2.2	<ul style="list-style-type: none"> <li>• Aim. ✓</li> <li>• Rate of flow. ✓</li> <li>• Quality of water. ✓</li> <li>• Availability of power/electricity. ✓</li> <li>• Mobility of pump. ✓</li> <li>• Simplicity of construction. ✓</li> <li>• Attention needed.</li> <li>• Cost and availability of parts.</li> <li>• DIY installation.</li> </ul>	(Any 5) (5)
	6.2.3	<ul style="list-style-type: none"> <li>• Irrigation from streams. ✓</li> <li>• Dams✓</li> <li>• Wells</li> </ul>	(Any 2) (2)

6.3	6.3.1	<ul style="list-style-type: none"> <li>• The bottom of the trench is loosely packed with large stones. ✓</li> <li>• It is then covered with smaller stones. ✓</li> <li>• Finally it is covered with gravel and soil. ✓</li> </ul>	(3)
	6.3.2	<ul style="list-style-type: none"> <li>• Installation costs are very high. ✓</li> <li>• Blockages occur from time to time and are expensive to correct. ✓</li> <li>• The installation requires technical knowledge and skills. ✓</li> </ul>	(3)
	6.3.3	<ul style="list-style-type: none"> <li>• Bury deep enough not to be damaged by implements. ✓</li> <li>• Bury in sand. ✓</li> <li>• Couplings must be firm and watertight. ✓</li> </ul>	(3)
6.4	6.4.1	<ul style="list-style-type: none"> <li>• Labour saving, one-man operation. ✓</li> <li>• Large fields can be irrigated at once. ✓</li> <li>• Even distribution of water. ✓</li> <li>• Water scheduling can effectively be introduced.</li> <li>• Fertigation is possible.</li> </ul>	(Any 3) (3)
	6.4.2	When the system gets out of line a safety switch ✓ cuts the electricity to the wheels ✓ preventing the other wheels from moving forward. ✓	(3)
	6.4.3	The tap at the end of the system is opened and all impurities in the pipe are flushed out. ✓ The tap is then closed and the irrigation system can function effectively. ✓	(2) <b>[30]</b>
<b>TOTAL SECTION B:</b>			<b>160</b>
<b>GRAND TOTAL:</b>			<b>200</b>