education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL TECHNOLOGY

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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)

4.2 4.2.1
- It is more compact. ✓
- It is much lighter. ✓
- Use less current. ✓
- Uses lower ampere to weld. ✓ (4)

4.2.2 Preliminary weld at the ends of the welded work piece✓ to ensure that the work pieces do not move apart ✓because of the high welding temperature when welded. ✓ (3)

4.3
- Vertical welding.✓
- Overhead welding.✓
- Pipe joint welding. (Any 2) (2)

4.4 4.4.1
- Mild steel.✓
- Cast iron.✓
- Stainless steel (Any 2) (2)

4.4.2
- Heat the metal until it has a red hot colour.✓
- Oxygen is then blasted onto the metal by pressing the lever on the torch.✓
- The metal actually burst into flames which give it more heat to keep the process going.✓
- The steel transforms into liquid.✓
- The metal liquid is removed from the cut with the force of the oxygen stream.✓ (5)

4.5
- The area of the metal must be clean. ✓
- Determine if the metal has been finished off. ✓
- Use a clean rag or paper to handle the metal. ✓
- Heat the metal a little bit for the varnish to flow better. (Any 3) (3)

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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)
				[40]

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	• Aim. ✓ • Rate of flow. ✓ • Quality of water. ✓ • Availability of power/electricity. ✓ • Mobility of pump. ✓ • Simplicity of construction. ✓ • Attention needed. • Cost and availability of parts. • DIY installation.	(Any 5)	(5)
	6.2.3	• Irrigation from streams. ✓ • Dams✓ • Wells	(Any 2)	(2)

6.3 6.3.1
- The bottom of the trench is loosely packed with large stones. ✓
- It is then covered with smaller stones. ✓
- Finally it is covered with gravel and soil. ✓ (3)

6.3.2
- Installation costs are very high. ✓
- Blockages occur from time to time and are expensive to correct.✓
- The installation requires technical knowledge and skills.✓ (3)

6.3.3
- Bury deep enough not to be damaged by implements.✓
- Bury in sand.✓
- Couplings must be firm and watertight. ✓ (3)

6.4 6.4.1
- Labour saving, one-man operation. ✓
- Large fields can be irrigated at once. ✓
- Even distribution of water. ✓
- Water scheduling can effectively be introduced.
- Fertigation is possible. (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)
[30]

TOTAL SECTION B: 160

GRAND TOTAL: 200