basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL TECHNOLOGY

NOVEMBER 2010

MEMORANDUM

MARKS: 200

This memorandum consists of 11 pages.

SECTION A

QUESTION 1

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

TOTAL SECTION A: 40

SECTION B

QUESTION 2: MATERIALS AND STRUCTURES

2.1 2.1.1

- Fences shall be installed and operated so that they cause no electrical hazard to persons, animals or the environment. ✓
- Electric fence constructions, which are likely to lead to entanglement of animals or persons, shall be avoided. ✓
- An electric fence shall not be supplied from more than one energiser.✓
- Barbed or razor wire shall not be electrified by an energiser. ✓
- Any part of an electric fence which is installed along a public path or highway shall be identified by **warning plates/signs**.✓
- The energiser earth electrode shall penetrate the ground to a depth of at least 1 metre.
- Connecting leads that are run underground shall be run in a conduit of insulating material.
- Connecting leads shall not be installed in the same conduit as the mains supply wiring, communication cables or data cables.
- Connecting leads and electric fence wires shall not cross above overhead power or communication lines.
- Crossings with overhead cables shall be avoided wherever possible. If such a crossing cannot be avoided, it shall be made underneath the power line and as nearly as possible at right angles to it. (Any 5) (5)

2.1.2

- Securely fastened to the fence posts or firmly clamped to the fence. ✓
- Sign must be attached at intervals approximately 10 metres to 50 metres, but not exceeding 90 metres.(visible) ✓
- The warning signs should be at least 100 mm x 200 mm. ✓
- The background colour of both sides should be yellow. ✓
- The inscription shall be black and should be the substance of **TAKE CARE – ELECTRIC FENCE.**
- The inscription should be indelible, inscribed on both sides and have a height of at least 25 mm.
- Use the local language of the area
- High enough for theft/
- Must be big enough/colourful
- Vandalism /Out of reach of children

(Any 4) (4)

2.1.3

- Bad joints. ✓
- Live wires touching the earth. ✓
- Improper insulation. ✓
- Vegetation/Animals/Humans touching the fence. (Any 3) (3)

2.1.4 Volume = Length x width x height ✓
= 500 x 500 x 900(0.5x0.5x0.9)✓
= 225 000 000 mm³(0.225)✓
= 225 000 000 ÷ 1000 000 000✓
= 0,225 m³✓

Or Volume = Length x width x height ✓
= (0.5x0.5x0.9)✓ ✓
= 0,225 m³✓✓ (5)

2.1.5
- By installing a lightning arrestor in the circuit of the electrical fence.✓
- Damage can be prevented by disconnecting the energiser from the fence line and disconnecting it from the power supply during electrical storms. ✓ (2)

2.2 2.2.1
- The triangular shape is sturdy, strong✓
- Is resistant to distortion through strong winds. ✓
- Round shape prevents hail and water damage
- The aerodynamic half round shape causes wind to deflect over the structure and not against it. **(any two)** (2)

2.2.2
- Strong ✓
- Light must penetrate the covering/translucent. ✓
- Keep insects and pests out. ✓
- Keep rainwater out. ✓
- Must be resistant to sun/heat, frost/snow, strong wind and hail.
- Not too expensive.
- No need to be replaced regularly/durable. (Any 4) (4)

2.2.3
- Make sure that the plastic covering draws tightly around the structure. Loose plastic is torn easily by the wind. ✓
- Repair tears immediately. ✓
- Paint all metal parts on a regular basis to prevent rusting. ✓ (3)

(Any valid reason that will damage the structure)

2.3
- Catalyst and accelerator should always be stored separately. (Explosion) ✓
- Remove all resin, catalyst and accelerator from skin. ✓
- Wear gloves if skin is sensitive. ✓
- Use acetone only in a well-ventilated area.
- Handle resin casting carefully as they are brittle.
- Prevent small pieces of fibre from penetrating the skin.
- Do not breathe in glass fibre or get it in your eyes.

(Any acceptable answer will be accepted as correct) (Any 3) (3)

2.4
- Good weldability ✓
- Corrosion resistant (not rust easy)✓
- Very durable
- For hygienic reasons (milk tanks and equipment etc.)

(Any acceptable answer will be accepted as correct) (Any 2) (2)

2.5
- 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 2) (2)

[35]

QUESTION 3: ENERGY

3.1 3.1.1
- The device shown in the picture is called a wind turbine. ✓
- Is used where no electricity is available or as an alternative energy source. ✓
- Wind turns the blades of the device. ✓
- The turning blades turn a generator. ✓
- This generator generates direct current electricity that cannot be utilised in an ordinary farming enterprise for electrical machines and equipment.
- The direct current is then changed to alternating current that can be used on the farm, with the aid of an inverter.
- The DC energy produced can be stored in batteries for standby electricity during windless periods. (Any 4) (4)

3.1.2
- Prevailing winds that are not strong enough or not constant enough. ✓
- Large trees or obstacles nearby that divert the prevailing winds from the turbine. ✓
- Inadequate maintenance. ✓
- Strong winds during storms can destroy the structure if preventative measures are not in place. (Any 3) (3)

3.1.3
- Release the pressure on the country's fossil fuel resources.✓
- Reduce pollution. ✓
- Cheap energy source. ✓
- Lesser oil imports for the country. (Any 3) (3)

3.2 3.2.1
- Geothermal-/heat-/kinetic(movement-)convection energy. ✓ (1)

3.2.2
- **Heat from the earth's** inner core where there is lava and it is very hot. ✓ (1)

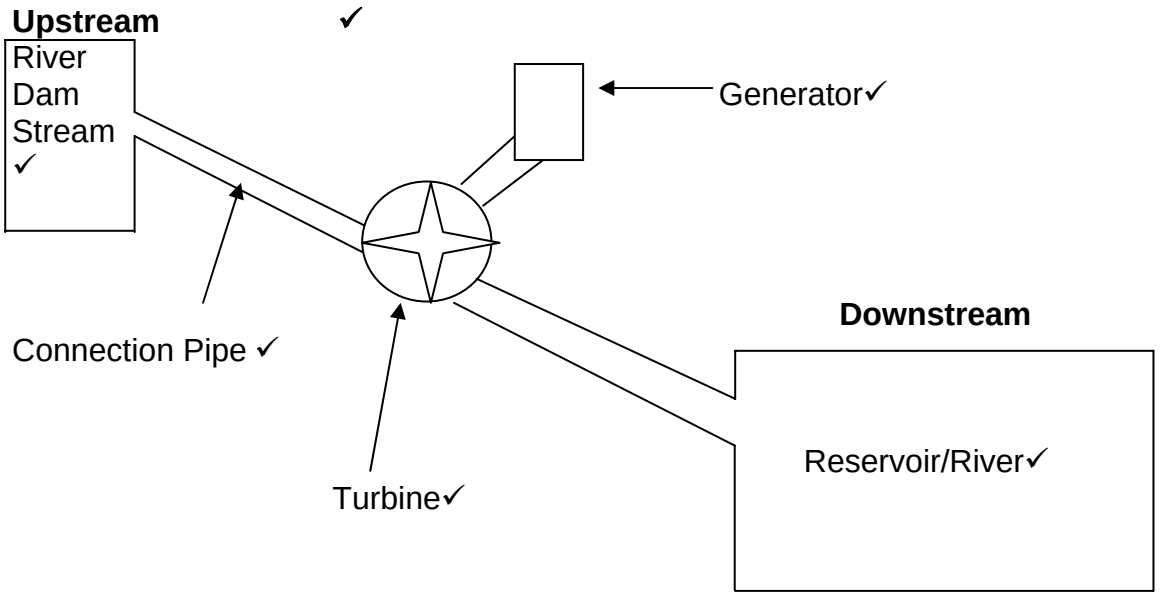
3.2.3
- Geothermal vents are not readily accessible. ✓
- Preliminary cost is high. ✓

- Cannot be utilised efficiently on a small scale. (Any 2) (2)

3.3 **Allocation of marks:**
Sketch itself (ONE mark)

The following items must appear in the drawing with their labels:

Upstream reservoir
Pipe connection to the turbine
Turbine
Generator
Downstream reservoir



(6)
(Any design is acceptable, as long as the six main components are included) **[20]**

QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES

4.1 4.1.1 MIG/MAG/CO_2 welding gun or gas metal arc-welding gun. ✓ (1)

4.1.2
A Welding electrode/filler wire✓
B Current contact tube✓
C Nozzle✓
D Gun switch✓
E Gun handle✓ (5)

4.1.3 **Composition**: Argon, ✓ helium ✓and carbon dioxide (CO_2). ✓
The function: Is to serve as a shield to protect the weld from pollution from the surrounding atmosphere. ✓ (4)

4.1.4 Push/Draw in any direction of travel✓ with a 70° to 80° angle to the work piece. ✓ (2)

4.2
- Tack the prepared work pieces together. ✓
- Lean the electrode in the direction of travel and point it slightly upwards.✓
- Strike an arc and run a bead along the joint. ✓
- If the force of the arc tends to undercut the work piece at the top of the bead, shorten the arc length and increase the upward angle of the electrode until a normal bead is formed. ✓
- If necessary, lower the amperage to give better control of the flow of metal. ✓
- After completion chip off the slag and inspect the bead. (5)

4.3 4.3.1 Flashback arrestor. ✓ (1)

4.3.2 Prevent flames from jumping back from the welding nozzle into the pipe,✓ causing the gas bottles to explode. ✓ (2)

4.4
- It is more compact. ✓
- It is much lighter in construction. ✓
- Use less current (economical). ✓ (3)
- Lower ampere
- Much safer to use
- Can do tack welding **(Any Three)**

4.5
- The welding plane continues to change because of the round structure of the pipes.✓
- The welder starts with upwards welding ✓
- Underhand welding ✓ (5)
- Downwards welding ✓
- Overhead welding. ✓

4.6 4.6.1
- Metal against metal friction✓
- Serious jolts or shocks of metal against rock✓
- Scraping, jolts and shocks✓
- Serious scraping (3)

(Any 3)

4.6.2
- Area to be covered must be free of corrosion, grease, oil or other foreign substances ✓ (2)
- By grinding or filing it away. ✓

4.6.3 Welding of patchwork or clamping the parts to a stable surface✓ and preventing the part to overheat. ✓ (2)

[35]

QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT

5.1
- Provides technology ✓
- Advancement to agriculture ✓
- Above the use of animal-drawn implements ✓
- To increase productivity, quality and yield. ✓
- To help the farmer to produce better, quicker, cheaper and more effectively. (Any 4) (4)

5.2
- Driving power.(Kw) ✓
- Local availability of parts and service. ✓
- Rigidity of construction. ✓
- Simplicity of control mechanisms. ✓
- Driver comfort.
- Versatility. (Two wheel or four wheel drive)
- Proven reliability and durability. (Any 4) (4)

5.3 5.3.1
- The yield data from the monitor is recorded and stored at regular intervals along with positional data received from the GPS unit. ✓
- GIS software✓
- Yield monitors are crop yield measuring devices installed on harvesting equipment. ✓ (4)
- Takes the yield data and produces yield maps. ✓

5.3.2 Farm equipment equipped with variable rate technology ('VRT')✓ along with GPS✓and monitors. (2)

5.4 5.4.1
- Decreasing the tow bar pulling force. ✓
- Lowering the tow bar. ✓
- Increase the wheel base of the tractor.
- Placing weights on the front part of the tractor. (Any 2) (2)

5.4.2 Roll bar/cage. ✓ (1)

5.5 A Levelling box ✓
B Top link ✓ (2)

5.6
- Appearance should be neat. ✓
- Safeguard the equipment/operator. ✓
- Removed and replaced easily. ✓
- Do not become loose.
- Weight saving.
- Keep out all undesired matter. (Any 3) (3)

5.7 5.7.1

RAM Baler (rectangular)	**Roller Baler (round)**
• Higher labour needs for handling bales.✓	Bales not easily transported. ✓
• Bales must be stored under cover. ✓	Bales must be handled mechanically.✓
• Higher maintenance requirements. ✓	No automatic packing machine for bales.✓
• Working more complicated.✓	Relatively vast storage area required for bales.✓
• Higher repair requirements. ✓	Use of bales for feeding problematic.✓

(10)

(Any FIVE disadvantages can be correct for 2 marks each)

5.7.2 Timing is the exact moment when the needles lift the binding rope✓ so that the compressed hay can be bound. ✓ (2)

5.8 5.8.1

- When the control lever is in neutral position, the oil is pumped to the control valve and back to the oil container via the oil filter. ✓
- The moment the control lever is shifted to the lift position, the control valve directs the pressurised oil to the piston end of the hydraulic cylinder causing the piston to move to the right, and the implement is lifted. ✓
- In order to force the implement into the soil, the operator moves the control lever to the 'lower' position and now the control valve will direct the pressurised oil along the second pipe into the shaft-end of the cylinder causing the piston to move to the left. ✓
- In this way, the operator controls the implement positively in two directions. ✓ (4)

5.8.2

- 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 keep parts clean. (Any 2) (2)

[40]

QUESTION 6: WATER MANAGEMENT

6.1 6.1.1
- The process to determine the correct frequency and duration of water application✓✓

(2)

6.1.2
- To save water✓
- To prevent overirrigation✓
- To prevent underirrigation✓
- To apply enough water to fully wet the plant's root zone
- To allow the soil to dry out in between water applications
- To allow air to enter the soil (aeration of the soil) (Any 3)
- To prevent leaching of nutrients

(3)

6.2 6.2.1 C✓
6.2.2 E/H✓
6.2.3 H✓
6.2.4 A✓
6.2.5 G✓ (5)

6.3 6.3.1
- Galvanised pipes or plastic pipes (PVC) ✓

(1)

6.3.2 **Galvanised pipes**:
- Long lifespan✓
- Cannot be constricted by roots✓
- Robust ✓
- Need no paint✓
- Cannot be damaged by digging✓
- Easily joined
- Resist high pressure

OR

Plastic pipes:
- Light and easy to handle
- Few joints necessary
- Long lengths laid in short time
- Lay easily around sharp bends
- Cuts and joins with ease
- Relatively cheap

(5)

6.4 6.4.1 Nipple/Male joint piece✓ (1)

6.4.2 Socket/Female joint piece✓ (1)

6.4.3 Plug✓ (1)

6.5 • Bleach would kill the bacteria ✓that are responsible for breaking down the sewage in a septic tank. ✓ (2)

6.6 6.6.1
- Foundation of the reservoir must be strong to prevent cracks in the dam.✓
- Foundation must be well compacted to prevent sagging. ✓
- Reinforcement must be build into the foundation and the walls of the dam. ✓
- Dam must be higher than the trough to ensure a steady flow of water. ✓
- Capacity of the reservoir must be efficient if two or more camps or troughs are served.
- Pipes to the troughs must be big enough to satisfy the needs of the animals.
- Is there a reliable water source nearby?
- Is it central to all seeping?
- Planning of the overflow.
- Safety to animals.
- Cost of dam.
- Open /close reservoir. **(Any 4)** (4)

6.6.2
- The pressure should be high enough to satisfy needs. ✓
- Prevent spillage. ✓
- Joints must be watertight.✓
- Spillage water should be able to drain away from the drinking area. ✓
- All valves/pipes should be protected. ✓
- Distance from the resource
- Capacity of the trough
- Needs of different types of animals
- Safety to animals **(Any 5)** (5)

[30]

TOTAL SECTION B: 160
GRAND TOTAL: 200