basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL TECHNOLOGY

NOVEMBER 2013

MEMORANDUM

MARKS: 200

This memorandum consists of 12 pages.

SECTION A

QUESTION 1

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

TOTAL SECTION A: (20 x 2) 40

SECTION B

QUESTION 2: MATERIALS AND STRUCTURES

2.1 2.1.1
- Isolate all sources of ignition. ✓
- Extinguishers (full) in hazardous areas. ✓
- No smoking signs in hazardous areas. ✓
- Exits clearly marked in hazardous areas. ✓
- Proper electrical installation. ✓
- Flammable materials stored safely. ✓
- Fire emergency numbers listed near telephone. ✓
- Emergency fire plan posted. ✓
- Make of firebreaks.
- **Any acceptable correct answer** ✓

(Any 8) (8)

2.1.2
- Only tackle a fire after the alarm has been raised and it is safe to do so. ✓
- Ensure you are accompanied when you fight a fire or go to investigate, never do it alone. ✓
- Only tackle a fire in its very early stage. ✓
- Put your safety and that of others first, no heroics! ✓
- Only use an extinguisher if you are sure of how to use it properly. ✓
- Do not hold the horn on a CO_2 extinguisher – it will be very cold.
- **Any acceptable correct answer regarding the safety measures**✓ (5)

(Any 5)

2.2
- stop the PTO before dismounting. ✓
- ensure that safety shields are in place before work starts. ✓
- replace cracked or defective safety shields immediately. ✓
- keep clothing, hair and all body parts away from a rotating PTO. ✓
- never step over a rotating PTO shaft.
- keep universal joints in phase.
- always use the driveline or PTO shaft recommended for your machine.
- position the tractor's drawbar properly. (Any 4) (4)

2.3 2.3.1 Chromium
- 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 3) (3)

2.3.2 Manganese

- 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 3) (3)

2.3.3 Nickel

- It improves the amount of toughness and the hardening ability✓
- It gives steel a fair amount of toughness at low temperatures. ✓
- Used with chromium, nickel helps to increase the hardening ability of steel much more than when only one of the elements is used on its own. ✓
- Steel which is alloyed with chromium and nickel is resistant to air, water and many chemical acids and alkali. (Any 3) (3)

2.4

- Type of material to be joined. ✓
- Conditions under which this joint will be used.✓ (2)

2.5 **Strengthening with reinforcement**: ✓

Reinforcement beams must be placed in a crisscross pattern in the foundation to prevent the shifting and cracking of the foundation. ✓

Thickness of the foundation: ✓

The thickness of the foundation must correlate with the weight of the structure.✓ (4)

2.6 Answer is B✓ (1)

2.7 2.7.1 Light penetration. ✓ (1)

2.7.2 The wire will shrink on a cold day and break. ✓ (1)

[35]

QUESTION 3: ENERGY

3.1 3.1.1 Solar(Sun)/Wind ✓
Solar/Sun energy is a freely available energy source✓
that is used to produce electricity✓
with the aid of a small photovoltaic cell/sun panel/solar cell. ✓
The solar cell is light weight ✓
and easily transportable to the new construction site of the portable fence. ✓

OR

Wind is freely available✓
and is used to drive a small turbine✓ that produces electricity. ✓
The small wind turbine is light weight ✓
and easily transportable✓
to the new construction site of the portable fence. ✓ (6)

3.1.2 Keeping wild animals and vermin away from domesticated farm animals and crops. ✓
Separate different groups of animals. ✓
Allowing rotational grazing.
Fencing animals off from eroded areas, trees, rivers and roads.
(Any 2) (2)

3.1.3 Affordable✓
Easily constructed✓
Durable
Light weight
Easily modified
Less animal hide and pelt damage
Deterrent to trespassers and predators (Any 2) (2)

3.2 3.2.1
- No fuel costs✓
- Low maintenance costs. ✓
- No clean-up costs✓
- No carbon tax costs✓
- Reduced oil imports
- No air pollution. Environmentally friendly
- Renewable energy source
- As a result, large numbers of wind turbines/solar cells could reduce dependence on other energy sources, providing a more dependable source of energy in the long term.
- Less expensive energy source.
- Great resource to generate energy in remote locations.
- Solar/Wind power technology is limitless
- Solar/Wind is also extremely portable.
- Solar/Wind power can create more energy than is necessary for a single family needs
- Extra power from solar panels and wind turbines can be fed back into the power grid, providing clean, free energy to people throughout an entire community.
- A renewable source. (Any 4) (4)

3.2.2 Solar cells are unable to produce electricity during the night time✓ and during cloudy days.✓

The wind turbine can produce electricity during the night✓ and during cloudy days when wind is available. ✓There might be sun during the day but no wind. (4)

3.3
- Vegetable oils✓
- Animal fats✓
- Recycled cooking oils (Any 2) (2)

[20]

QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES

4.1 4.1.1
- Inverter welding machine mainly related to more electronic components that can cause malfunctions/breakages. ✓
- Complex structure. ✓
- Inverter welding machine is more expensive (2)
- Arc-welder can be driven by the PTO of a tractor whereby the inverter needs an energy source
- Parameter setting difficult/ Welding current settings difficult. (Any 2)

4.1.2
- Gravity can cause metal to drip or run down. ✓
- Keep puddle small. ✓
- Prevent over penetration, burning through. ✓
- Electrode size plays a role in penetration.
- Current plays a dominant role in the welding process.
- Surface area must be cleaned thoroughly. (Any 3) (3)

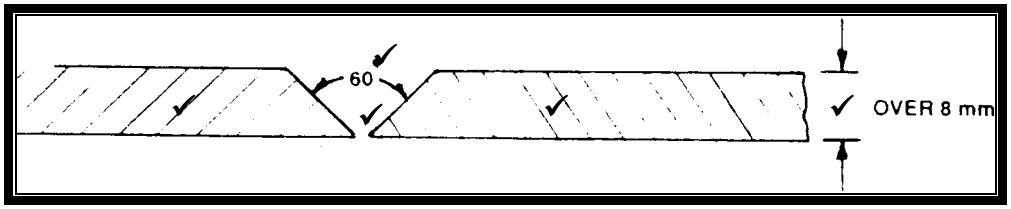
4.2
- Set up a cleaned work piece.✓
- Work pieces of 5mm or less in thickness. ✓
- Put on the welding goggles. ✓
- Light up the torch to give a neutral flame. ✓
- Take a 3mm copper coated welding rod. ✓
- Starting at the beginning of the joint, hold the welding torch so that its tip forms an angle of approximately 45°-60° with the work piece.✓
- Hold the flame steady over the work piece with the inner flame approximately 3 mm above the surface to be welded.
- When the work piece has heated up sufficiently it melts and forms a pool.
- To prevent a hole being burnt through the metal, lift the torch tip slightly to keep the pool small.
- When you have established the pool, place the end of the filler rod at a 45°-60° angle in the centre of the pool.
- As the weld progresses the filler rod melts and has to be continually fed into the weld.
- The longer you hold the filler rod in the pool, the larger the build up of the weld.
- The filler rod must be removed from the pool when there is enough build up.
- When the filler rod is not in the pool, the end is kept just inside the flame
- Continue with the weld until a bead is formed. (Any 6) (6)

4.3 4.3.1 MIG/MAG/CO_2 welder✓ (1)

4.3.2 It is an arc welding process in which individual consumable electrodes ✓ (standard welding rods) are replaced by continuously fed wire, ✓ and an insert gas shield replaces electrode flux. ✓ (3)

4.3.3 Commercially available mixture with oxygen✓
Argon ✓
helium ✓
carbon dioxide (CO_2). ✓ (Any 3) (3)

4.4



(5)

4.5
- Leftward welding technique. ✓
  - Used to weld mild steel sheet up to 5mm✓
- Rightward welding technique. ✓
  - Used to weld mild steel sheet thicker than 5mm. ✓
- Vertical welding. ✓
  - Welding starts at the lower end of the weld, and then moves upwards to the end of the work piece. ✓ (3 x 2) (6)

4.6 When metal is heated, it expands✓
and when it cools down it shrinks. ✓
The shrinking of welded metal, as well as weld runs, causes distortion of sheets when they cool down. ✓
Shrinking takes place in all directions simultaneously and therefore causes various types of distortion. ✓ (4)

4.7
- Pre-setting. ✓
- Welding of patch work. ✓
- Clamping.
- Spot/Tag-welding.

(Any 2) (2)
[35]

QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT

5.1 5.1.1 It is the exact moment when the needles lift the binding rope✓ so that the compressed hay can be bound. ✓ (2)

5.1.2
- Lubrication. ✓
- Check all bearings, chains and gears. ✓
- Check all safety clutches. ✓
- Sharpen all blades.
- Check tyre pressure.
- Check bolt tension.
- Inspect chassis and tyres for damage. (Any 3) (3)

5.1.3
- Slip clutch. ✓
- Screens. ✓
- Shear bolts✓
- Ram stop safety mechanism✓ (4)

5.2 5.2.1 Three-point mechanism✓ consisting of two lifting arms✓ and a top link. ✓ (3)

5.2.2 Universal joint.✓ (1)

5.2.3
- Strong✓
- Easily to remove/install✓
- Not become loose✓
- Weight saving✓ (3)
- Must provide adequate/efficient protection. (Any 3)

5.3 Fixed capital ✓
Moveable capital✓
Working or floating capital✓ (3)

5.4
- Loss of maize kernels due to blowers that is set incorrectly. ✓
- Thresher that breaks the kernels. ✓
- Too much foreign particles. ✓
- Mechanical problems. ✓
- Electrical problems✓
- Cannot use harvester when the crop is wet due to rain or irrigation. (Any 4) (4)

5.5 5.5.1 Straight-cut gear/Spur gear✓ (1)

5.5.2 Last very long. ✓ (1)

5.5.3
- Sliding gearbox/Manual✓
- Constant mesh gearbox✓
- Synchronised gearbox✓
- Automatic
- Trip-tronic
- Pre-select (Any 3) (3)

5.6 5.6.1
- Sturdy construction. ✓
- Replaceable wearing parts. ✓
- Rotor housing should close tightly. ✓
- Strength of power source available✓
- Size of the hopper feed aperture. (4)
- Amount and type of feed that must be grounded. (Any 4)

5.6.2
- The mass of the moving parts is spread equally over bearings.✓
- Cyclone hangs level on the blower pipe. ✓
- Looks neat. ✓ (3)

5.6.3
- Do not work on the machine while it is still in motion. ✓
- Ensure that there are no loose objects lying inside the machine when starting it. ✓
- Wear safety gear. ✓
- Do not use the machine when the rotor is out of balance. ✓
- Driving mechanism must be screened off. ✓
- Use in a well ventilated area.
- Small pieces of scrap metal must be kept away from fodder.
- It can cause a spark, which can start an explosion. (Any 5) (5)

[40]

QUESTION 6: WATER MANAGEMENT

6.1 6.1.1
- Quantity of water✓
- Topography ✓
- Frequency of irrigation ✓
- Duration of application✓
- Needs of the plant.
- Plant density.
- Soil moisture.
- Prevailing rainfall. (Any 3) (3)

6.1.2 It is to apply enough water to fully wet the plant's root zone ✓
while minimizing overwatering ✓
and then allow the soil to dry out in between watering, ✓
to allow air to enter the soil, but not so that the plant is stressed beyond what is allowable. ✓ (4)

6.2 6.2.1 E✓
6.2.2 A✓
6.2.3 B✓
6.2.4 C✓
6.2.5 D✓ (5)

6.3 6.3.1 Natural system✓
Regular system✓ (2)

6.3.2 Pyramids of three or six poles✓
are laid lengthwise along the bottom of an open trench and covered with grass ✓
before filling it with soil. ✓ (3)

6.3.3
- Installation costs are high. ✓
- Blockages occur from time to time and are expensive to correct. ✓
- The installation requires technical skills and knowledge. ✓

(3)

6.4 6.4.1 Only water without solid particles ✓ must flow out through the top pipe and then seeps away into the soil. ✓ (2)

6.4.2
- Any household component connected to the sewage system.✓
- Septic tank✓
- Distribution box✓
- Absorption field✓
- Cesspools✓
- Vent
- PVC/ceramic pipes. (Any 5) (5)

6.4.3
- Detergents. ✓
- Laundry waste. ✓
- Bleach. ✓
- Household chemicals.
- Caustic drain openers.
- Garbage disposal unit which substantially increase the accumulation of solids.
- Disposal of items not biodegradable in the system (plastics etc.)
- Disposal of excessive amounts of grease and fats, which are biodegradable but need particular types of bacteria to digest.
- Disposal of cigarette butts and sanitary napkins which are also biodegradable but are not readily decomposable.
- Too many people using a smaller/inadequate or failing system.

(Any 3) (3)
[30]

TOTAL SECTION B: 160
GRAND TOTAL: 200