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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 CO₂ extinguisher – it will be very cold.
• **Any acceptable correct answer regarding the safety measures** ✓
(Any 5) (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/CO₂ 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 inert gas shield replaces electrode flux. ✓ (3)

4.3.3 Commercially available mixture with oxygen✓

Argon ✓

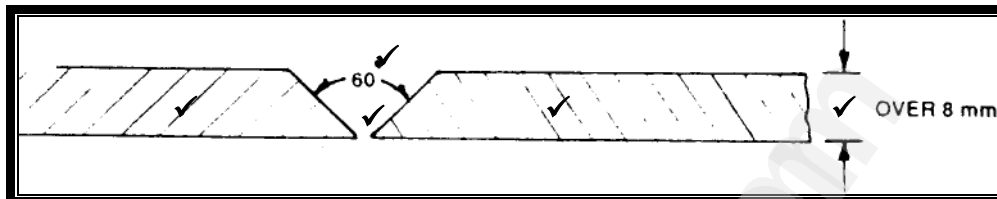
helium ✓

carbon dioxide (CO₂). ✓

(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✓
 - Must provide adequate/efficient protection. (Any 3) (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.
 - Amount and type of feed that must be grounded.
- (Any 4) (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