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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL TECHNOLOGY

NOVEMBER 2018

MARKING GUIDELINES

MARKS: 200

These marking guidelines consist of 14 pages.

SECTION A**QUESTION 1**

1.1	1.1.1	C✓✓		(2)
	1.1.2	D✓✓		(2)
	1.1.3	B✓✓		(2)
	1.1.4	D✓✓		(2)
	1.1.5	B✓✓		(2)
	1.1.6	A✓✓		(2)
	1.1.7	C✓✓		(2)
	1.1.8	C✓✓		(2)
	1.1.9	C✓✓		(2)
	1.1.10	A✓✓		(2)
			(10 x 2)	(20)
1.2	1.2.1	one way valve/non return valve✓✓		(2)
	1.2.2	timing✓✓		(2)
	1.2.3	Alternator/invertor✓✓		(2)
	1.2.4	Hopper/inlet trough/Thought/A uger/Conveyer belt.✓✓		(2)
	1.2.5	Nipple/Pump/Gun✓✓		(2)
			(5 x 2)	(10)
1.3	1.3.1	A✓✓		(2)
	1.3.2	C✓✓		(2)
	1.3.3	H✓✓		(2)
	1.3.4	D✓✓		(2)
	1.3.5	B✓✓		(2)
			(5 x 2)	(10)
TOTAL SECTION A:				40

SECTION B**QUESTION 2: MATERIALS AND STRUCTURES****2.1 2.1.1 TWO elements that decrease magnetism in stainless steel.**

Chromium, ✓ Nickel ✓ and Manganese ✓ (Any 2) (2)

2.1.2 THREE properties of copper.

- Excellent conductor of electricity ✓
 - Good conductor of heat ✓
 - Strong ✓
 - Ductile ✓
 - Easily joined by soldering or brazing ✓
 - Hygienic ✓
 - Easy to alloy ✓
 - Resists corrosion ✓
 - Durability ✓
 - Soft metal ✓
 - Pliable ✓
- (Any 3) (3)

2.1.3 TWO requirements that determine the composition of brass.

- Manufacturing requirements ✓
 - Application requirements/purpose ✓
 - Cost effectiveness ✓
- (Any 2) (2)

2.1.4 Properties of Tin.

- Silvery-white ✓
 - Soft ✓
 - Malleable metal ✓
 - It can be highly polished ✓
 - An oxide film form on exposed surfaces ✓
 - When tin is bent, a 'tin cry' is heard, due to the breaking of crystals ✓
 - Prevent corrosion ✓
 - Prevents contamination of food ✓
 - Easy to blend/ Use as alloy ✓
 - Conduct electricity ✓
- (Any 3) (3)

2.2 2.2.1 Description of 'elasticity' of adhesives.

Degree of hardness and brittleness of the adhesive when they dry-off. ✓
Must stay elastic even after it dried. ✓ (2)

2.2.2 THREE recommendations to improve the strength of an adhesive.

- Apply a thin base coat if the surface is very porous✓
- Apply only a thin layer of adhesive✓
- Apply adhesive to both surfaces✓
- Avoid thick layer of adhesive on a joint✓
- Avoid thick layer of adhesive on a joint✓
- Surface must be clean✓
- Make the surface rough✓
- Correct adhesive✓
- Wait till dry before joining✓
- Correct kind of adhesive✓

(Any 3)

(3)

2.3 THREE safety precautions which are applicable to glass fibre.

- Catalyst and accelerator should always be stored separately.✓
- Remove all resin catalyst and accelerator from skin.✓
- Wear hand gloves if skin is sensitive.✓
- Glass fibre matting has small pieces of fibre that can penetrate the skin.✓
- Use nose mask (avoid breathing in glass fibre) ✓
- Use protective glasses (protect the eyes).✓
- Use acetone in a well-ventilated room.✓
- Handle resin castings carefully, they are brittle and have sharp edges.✓
- Wear overall/ protective clothing.✓

(Any 3)

(3)

2.4 THREE advantages of Vesconite.

- Easy to fit and remove.✓
- Does not corrode and is non-conductive.✓
- Will not wear shafts and liners like traditional materials.✓
- Resistant to a wide range of materials.✓
- Bearings will not seize on the axle✓
- Will not expand in water✓
- Does not delaminate✓
- Low friction coefficient✓
- Can be used without any lubrication✓
- Low maintenance✓

(Any 3)

(3)

2.5 THREE substances that do not have an influence on a Teflon coating.

- Asphalt✓
- Dyes✓
- Greases/oil✓
- Glue✓
- Latex✓
- Lacquers✓
- Paints✓
- Acids/chemicals/water✓

(Any 3)

(3)

2.6 THREE safety standards of insulation material used in buildings.

- 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.✓
- Must not be heavy./Must be lightweight.✓

(Any 3) (3)

2.7 2.7.1 THREE causes of short circuit that appears on an electric fences.

- Vegetation touching the fence✓
- Leakage✓
- Faulty joints✓
- Broken wires✓
- Faulty insulators✓
- Moist conditions✓
- People and animals✓
- Lightning✓

(Any 3) (3)

2.7.2 Placing of safety signs on an electric fence.

- Gates/doors✓
- Fence wire✓
- Fence poles✓
- Spacing✓
- Where people came in contact with the fence✓

(Any 2) (2)

2.7.3 THREE functions of the covering material used on underground electric fence cables.

- Protect cable against mechanical damage (tractors, spades, etc.)✓
- Protect from corrosion✓
- Isolation✓
- Protect cable against water/moist✓

(Any 3) (3)
[35]

QUESTION 3: ENERGY**3.1 3.1.1 Explanation of the requirements of a suitable location to install a wind turbine.**

- Wind turbines require a substantial wind speed to generate electricity efficiently.✓
- The faster the wind, the more output in watts you can generate, but you cannot go over your turbines capacity.✓
- The location must be surrounded by open fields.✓
- If there are any large hills or mountains close by, then the placement of wind turbines may not be your best option.✓
- If there is a forest or collection of trees nearby, then you cannot optimize wind energy.✓
- Make sure your turbine is facing the most common wind direction.✓
- Not close to overhead electric cables.✓
- Not close to houses.✓

(Any 4) (4)

3.1.2 THREE advantages of wind energy.

- Wind power has no fuel costs.✓
- Low or negligible costs for maintenance.✓
- No carbon tax costs.✓
- Natural gas and oil imports can be reduced.✓
- Wind turbines are emissions-free, which means they do not contribute to air pollution.✓
- Wind is a renewable energy source unlike fossil fuels, which are an exhaustible source of energy.✓
- As a result, large numbers of wind turbines could reduce dependence on other energy sources, providing a more dependable source of energy in the long term.✓
- Wind energy is much cheaper than other sources of energy.✓
- Wind turbines are a great resource to generate energy in remote locations, such as mountain communities and remote countryside.✓
- Wind power has no clean-up costs, fossil fuels do.✓

(Any 3) (3)

3.2 FOUR factors that will have a negative influence on the efficiency of a photo voltaic solar panel system.

- The cell is not working to its full potential due to some electrons being lost.✓
- When the electrons release heat; the panel also becomes warm, interfering with other aspects of the solar cells.✓
- Number of solar panels determines the efficiency of the system.✓
- Expensive natural energy technologies produce more efficiently than cheaper ones.✓
- Obviously nearer the equator, you will receive a slightly better output with a given cell (location).✓
- Solar cells should always be facing the direction of the sun.✓
- No objects blocking the sun's rays.✓
- Electrical short✓

(Any 4) (4)

3.3 TWO problems associated with the generation of geothermal energy.

- You must not pump too much cold water into the earth, as this could cool your geothermal heat source.✓
- Geothermal power plants must be protected from escaping gases from deep within the earth.✓
- Location of the geothermal power plant.✓
- Cost of generating electricity.✓
- Water pollution✓
- Cost✓
- Contamination of the water✓

(Any 2) (2)

3.4 The material that is suitable for manufacturing Biofuel and an explanation.

Any plant matter or animal waste✓ that can combust.✓ (2)

3.5 TWO processes that are used in the manufacturing of ethanol.

- Fermentation✓
 - Distillation✓
- (2)

3.6 THREE advantages of methanol as an alternative fuel.

- It offers lower exhaust emissions.✓
- Produces higher vehicle performance.✓
- It can easily be made into hydrogen.✓
- Can be used in methanol direct fuel cells.✓
- Methanol has a lower risk of flammability than gasoline.✓

(Any 3) (3)

[20]

QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES**4.1 Comparison of MIG-welding and Arc-welding under given headings.**

Criteria	MIG-welding	Arc-welding
Welding speed.	Higher welding speed ✓	Slower welding speed ✓
Forming of slag	No slag formed on welding run ✓	Slag is formed on the welding run ✓
Start-up cost	Higher initial cost ✓	Lower initial cost. ✓
Equipment working in windy condition	Cannot weld in windy conditions ✓	Can weld in windy conditions ✓

(8)

4.2 4.2.1 Function of the MIG part.

- This device adjusts the tension ✓ on the welding wire. ✓
- Wire Feeder ✓ ✓

(Any 1)

(2)

4.2.2 FIVE safety measures that must be followed when welding with the MIG-welding machine.

- Remove all materials that can catch fire. ✓
- Protect eyes by wearing a welding shield/screens. ✓
- Wear welding gloves to handle hot metal. ✓
- Wear leather/cotton apron for UV protection and heat. ✓
- Weld in well-ventilated area for fumes. ✓
- Prevent burns or sparks on the face by wearing a welding shield. ✓
- Do not wear open shoes. ✓
- Stand on rubber matt. ✓

(Any 5)

(5)

4.3 THREE different types of welding movements that can be used for arc-welding run and make a drawing of each welding figure.

Type of run	Figure
Figure 8 ✓	8 ✓
U-shape ✓	U ✓
Zigzag ✓	Z ✓
Triangle ✓	△ ✓

(Any 3 x 2)

(6)

4.4 Description of the cutting process that must be followed to ensure a safe and clean cut when cutting a 10 mm steel plate with the oxy-acetylene cutting torch.

- Set the required gas flow on the cylinders.✓
- Set the oxy-acetylene torch according to the need.✓
- Heat the material up to red hot.✓
- Press the oxygen lever to blow away the melted metal.✓

(4)

4.5 Explanation of the influence that water/moisture has on the plasma cutter nozzle.

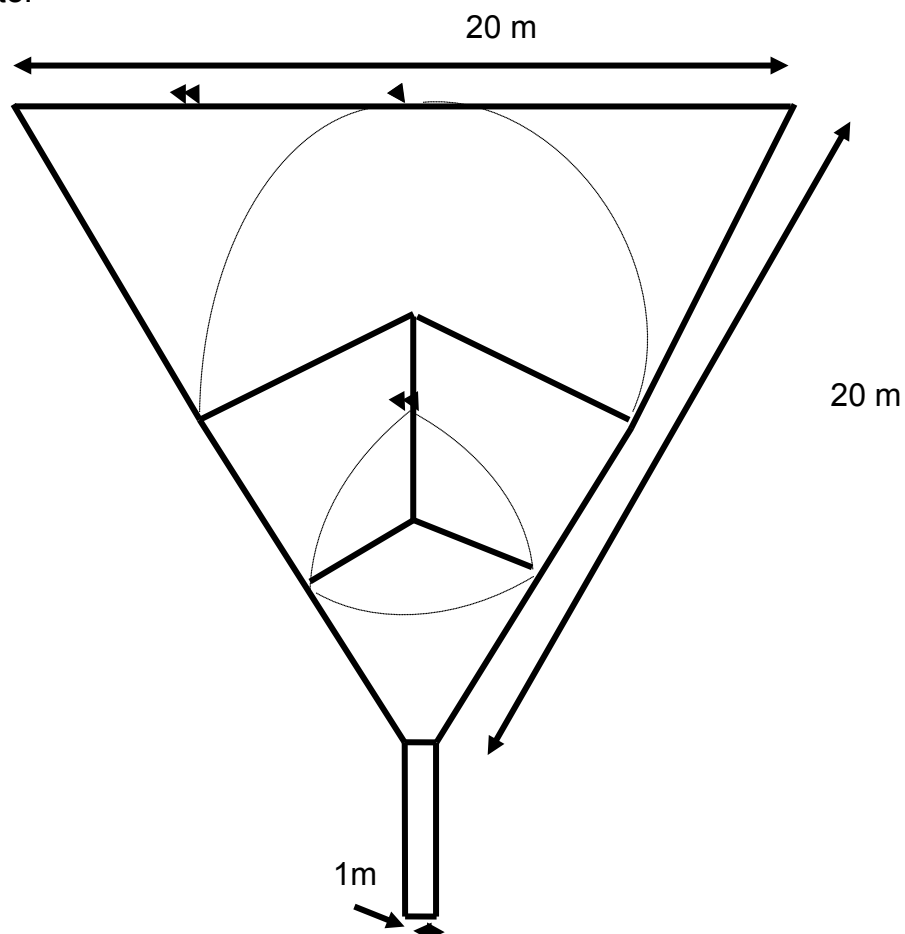
Water entering the torch nozzle can cause a short circuit.✓ The short circuit causes damage to the nozzle because of the internal arcing that takes place.✓
Unevenness of the flame.✓

(Any 2)

(2)

4.6 Design of a cattle handling facility for 50 cattle consisting of one big holding kraal, three smaller kraals, a crush pen and functional gates.**MARKING INSTRUCTIONS:**

- Effective design (one big kraal ✓, three smaller kraals ✓ and a crush pen ✓) (3)
 Enough gates to facilitate the handling process.✓ (1)
 Placing/functionality of the gates. ✓ (2)
 Measurements/headings.✓ (1)
 Entrance gate.✓ (1)

**[35]**

QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT**5.1 5.1.1 THREE factors with a short explanation of each that have an influence on the depth control system of a tractor.**

- Soil resistance:✓ On sandy soils the plough will go deeper. In hard soil the plough will not penetrate easily.✓
- Forward speed of the tractor:✓ When ploughing at high speed, the plough will not penetrate effectively. ✓
- Ploughing depth:✓ Soil will have a great influence on the plough when ploughing deep. ✓

(6)

5.1.2 THREE items on the tractor that the driver must inspect before starting the tractor.

- Fuel level✓
- Water level✓
- Oil level✓
- Tyre pressure✓
- Any liquid leaks✓(Oil, water or fuel)
- Any repairs needed ✓(Electrical etc.)
- Loose electrical wires✓
- Battery water level✓
- All safety guards in position✓
- Any parts of a tractor✓

(Any 3)

(3)

5.2 FIVE advantages of modern combine harvesters over manual harvesting methods.

- Very quick way of harvesting the crop.✓
- Very reliable method of harvesting.✓
- Economical.✓
- Labour saving.✓
- Accurate record keeping.✓
- Computers do the whole harvesting processes with little input from the driver.✓
- Single operation.✓

(Any 5)

(5)

5.3 FOUR requirements that safety screens on farm machinery must comply with.

- Safeguard the equipment✓
- Safeguard the operator✓
- Removed and replaced easily✓
- Must appear neat✓
- Must be properly installed.(not loosened while in motion)✓
- Weight saving✓(light)
- Keep out all undesired material✓
- Strong✓
- Not broken✓
- Safety signs on screens.

(Any 4)

(4)

5.4 5.4.1 The device (A or B) that will be found in a ripper to protect the teeth from braking when it gets stuck behind a rock or plant root.

A✓

(1)

5.4.2 THREE functions of the slip clutch found in the drive mechanism of a baler.

- Prevent heavy objects from being taken into the baler.✓
- Protect the pick-up if it is impeded by anything.✓
- Protect the auger if it becomes overloaded.✓
- Moving parts are protected. ✓

(Any 3)

(3)

5.4.3 The device, in diagram B, that enables the driveshaft connected to the slip clutch to work at an angle.

Universal joint✓

U coupling✓

(1)

5.5 FIVE factors that must be taken into consideration when planning the purchase of a new tractor.

- Driving power✓
- Local availability of parts and service✓
- Rigidity of construction✓
- Simplicity of control mechanisms✓
- Driver comfort✓
- Versatility✓
- Proven reliability and durability✓
- Type of drive necessary✓
- Cost/Price of the tractor✓

(Any 5)

(5)

5.6 Comparison between the V-belt and flat belt's under the headings that are given.

Headings	V-Belt	Flat belt
Easy to of install	Difficult to install✓	Easy to install✓
Used over long distance	Not manufactured to run over long distance✓	Can run over long distance✓
Lengthened or shortened	Length cannot be changed✓	Easily lengthened and shortened✓
Slip under tension	Do not easily slip ✓	Pulleys do slip✓

(8)

5.7 The effect that the presence of air has on the working of a hydraulic system.

The air is compressible✓ that will lead to higher pressure in the hydraulic system✓ and can cause pipes to burst.✓ The piston on the receiving side will not react as required because there is no direct pressure. ✓
The system will shudder✓

(4)

[40]**QUESTION 6: WATER MANAGEMENT****6.1 THREE advantages of system A over system B.**

- This system is less expensive to install.✓
- It consists of sections that can be easily disconnected.✓
- They are used for small or square shaped fields.✓
- Less crop damage.✓
- No electricity needed.✓
- Can easily been moved to another land.

(Any 3)

(3)

6.2 THREE sources that a 'Smart Controller' uses to determine local weather conditions.

- Soil sensor✓
- Rain sensors✓
- Satellite feed ✓
- weather station✓
- Internet/Wi-Fi✓
- Evaporation pan✓
- Radar✓
- Moist sensors✓

(Any 3)

(3)

6.3 Recommendation to a farmer on to consider before choosing a type of irrigation system for a piece of land.

- The size of the area to be irrigated.✓
- The shape of the land.✓
- Obstructions, such as trees or rocks.✓
- How deep the soil needs to be watered.✓
- How much time and effort is available to use the system.✓
- Type of crop under cultivation. ✓
- Cost ✓
- Amount of water available✓

(Any 3)

(3)

6.4 THREE instances where flood irrigation would be preferred over sprinkler irrigation.

- When water supply is of abundance.✓
- Surface gradient cannot lead to erosion.✓
- Infiltration tempo is constant.✓
- Where soil has good water absorption.✓
- Landscape has a suitable slope.✓
- Initial setup cost is low.✓
- Finance available✓
- When land is next to a non-consistent river✓

(Any 3) (3)

6.5 6.5.1 The mistakes in the design drawing of a septic tank.

- Inlet must be higher than the wall.✓
- Outlet must be lower than the wall. Make the wall higher✓

(2)

6.5.2 THREE items that must NOT be flushed down a septic tank drainage system.

- Plastics or non-degradable materials✓
- Cigarette buds, rags etc. should get into the tank✓
- Disinfectants should be used✓
- Paper or sanitary towels that does not dissolve easily✓
- Bleaches✓
- Oils or fatty substances✓
- Drain openers✓

(Any 3) (3)

6.5.3 What will happen in a septic tank drainage system if the bacteria are destroyed?

- The system will simply act as a holding tank for waste.✓
- It will fill up with waste.✓
- Natural decomposition will not occur.✓

(Any 2) (2)

6.6 TWO factors that will determine the cleaning of a septic tank.

- The amount of waste water that goes through the system each day.✓
- The amount of excess fats, rinds and other similar garbage in the drain.✓
- Working of the bacteria.✓
- Seize of the tank.✓

(2)

6.7 Calculation of the flow rate of a tank (litre per minute) by using the data below:**(Show all calculations)****The capacity of the tank is 20 k ℓ****It took 40 minutes to fill the tank to the top.****Use the formula: Flow rate = $\frac{\text{capacity}}{\text{time}}$**

$$\begin{aligned}
 \text{Flow rate} &= \frac{\text{capacity}}{\text{Time}} \\
 &= \frac{20 \times 1000}{40} \checkmark \\
 &= \frac{20000}{40} \checkmark \\
 &= 500 \checkmark \text{ ℓ/minute} \checkmark
 \end{aligned}$$

(4)

6.8 Function of GPS, GIS and VRT.

GPS	Pinpoints exact position up to one meter✓
GIS	Shows areas of under growth/over watering/under watering✓
VRT	Consists of farm field equipment with the ability to precisely control or measure the rate of application✓

(3)

6.9 Components on the whole house filtering system that must be checked and replaced on a regular basis.

- Filter elements/cartridges.✓
- O-rings.✓
- Salt in the water softener.✓
- Pipes✓
- Sieve✓
- Pumps✓
- Tanks✓
- Taps✓
- Valves✓

(Any 2) (2)

[30]

TOTAL SECTION B: 160
GRAND TOTAL: 200