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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE / NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL TECHNOLOGY

NOVEMBER 2020

POINTS: 200

TIME: 3 hours

This question paper consists of 16 pages.

INSTRUCTIONS AND INFORMATION

1. GENERAL INSTRUCTIONS AND INFORMATION
 - 1.1 This question paper consists of TWO sections, namely SECTION A and SECTION B.
 - 1.2 BOTH sections are COMPULSORY.
 - 1.3 Answer ALL the questions in the ANSWER BOOK.
 - 1.4 Number the answers correctly according to the numbering system used in this question paper.
 - 1.5 You may use a non-programmable calculator.
 - 1.6 Write neatly and legibly.
2. SECTION A: SHORT QUESTIONS
 - 2.1 This section consists of THREE questions.
 - 2.2 Follow the instructions when answering the questions.
3. SECTION B: STRUCTURED LONG QUESTIONS
 - 3.1 This section consists of FIVE questions.
 - 3.2 Start EACH question on a NEW page.

SECTION A**QUESTION 1**

- 1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A – D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.
- 1.1.1 Aluminum is preferred for the manufacture of soda cans because it...
- A air permeability.
 - B resistant to acids. is
 - C lightweight.
 - D is an elastic material.
- 1.1.2 All workshops must be equipped with fire extinguishers:
- A Occupational Health and Safety Act, 1993 (Act 85 of 1993) ('OHS')
 - B Compensation for Occupational Injuries and Diseases Act, 1993 (Act 130 of 1993)
 - C Labor Relations Act, 1995 (Act 66 of 1995) Basic Conditions
 - D of Employment Act, 1997 (Act 75 of 1997)
- 1.1.3 Which ONE of the following is NOT an objective of standardizing farm implements?
- A Make maintenance and repairs easier Make
 - B implements interchangeable and easier to handle
 - C Prevent one tractor company from forming a
 - D monopoly Reduce the cost of spare parts
- 1.1.4 The... type power take-off (CAT) enables the operator to stop the forward movement of the tractor without stopping the CAT drive.
- A static
 - B general
 - C lively
 - D double acting
- 1.1.5 Which ONE of the following is NOT allowed when a tractor is used on the farm?
- A Install a roller bar on the tractor.
 - B Allow an additional passenger on the tractor.
 - C Displays a slow-moving vehicle sign. Install a
 - D reverse gear alarm.

- 1.1.6 The noise of an auxiliary generator can be reduced by...
- A to shorten the exhaust pipe.
 - B install a silencer in the exhaust system.
 - C the reduction of the silencer box. turn it off during
 - D thunderstorms.
- 1.1.7 The mechanism on a tractor that ensures that the tractor operates at a constant depth:
- A Stabilization chains
 - B Level box
 - C Sensitivity element
 - D CAT shaft ('PTO shaft')
- 1.1.8 A closed diff provides equal amount... to each of the two wheels on an axle.
- A traction
 - B compressive force
 - C torque
 - D gripping force
- 1.1.9 an... is a positive mechanical coupling between different rotating axes that enables the axles to work at different angles.
- A Printing plate
 - B Crucible
 - C Cross coupling
 - D Upper rod
- 1.1.10 Even distribution of the effluent from the septic tank to the drainage unit or leaching well:
- A Distribution box
 - B Muffler
 - C Mangat
 - D Partition wall
- (10 x 2) (20)

1.2 Change the UNDERLINED word in each of the following statements to make it TRUE. Write only the word next to the question numbers (1.2.1 to 1.2.5) in the ANSWER BOOK, e.g. 1.2.6 Tractor.

1.2.1 Nickel changes the band structure of stainless steel and at the same time causes a decrease in impact strength.

1.2.2 Bronze is an alloy that is mainly made of titanium exists, usually with tin as the main additive.

1.2.3 Boute is used to attach wires to electric fence posts to prevent energy loss through the posts and ground.

1.2.4 Galvanized steel contains a magnesium layer that produces toxic gas that can cause cancer when burned.

1.2.5 The gassweis machine is used by robots in the automobile manufacturing industry to weld the body panels of vehicles.

(5 x 2) (10)

1.3 Choose a word / term from COLUMN B that matches the description in COLUMN A. Write only the letter (A – H) next to the question numbers (1.3.1 to 1.3.5) in the ANSWER BOOK, e.g. 1.3.6 J.

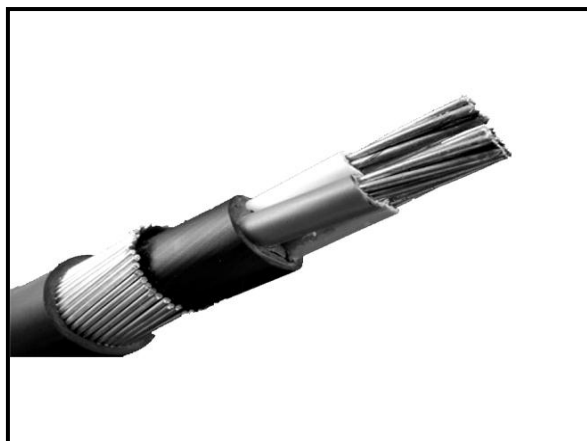
COLUMN A		COLUMN B	
1.3.1	Separate the ground material from the air in the hammer mill	A	brake fluid
1.3.2	Separate the straw / chaff and the maize kernels in the harvester	B	cabin
1.3.3	Component that handles the lubrication of moving parts allow implements	C	rotor
1.3.4	A high viscosity fluid used in the hydraulic system of a front loader excavator	D	cyclone
1.3.5	Protect the tractor operator from serious injuries if a tractor overturns	E	transmission oil
		F	grease nipple
		G	seven
		H	computer

(5 x 2) (10)

TOTAL SECTION A: 40

SECTION B**QUESTION 2: MATERIAL AND STRUCTURES****Start this question on a NEW page.**

2.1 The diagram below shows an electrical cable with insulation and copper conductors.



2.1.1 Explain why copper is suitable for the manufacture of electrical cables. (2)

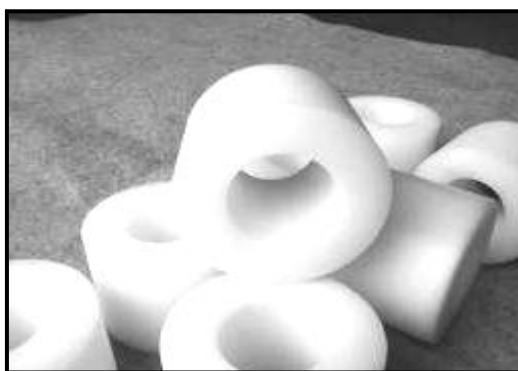
2.1.2 Discuss THREE safety precautions to consider when installing the electrical cables and wiring of electric fences. (3)

2.1.3 Lightning striking the electric fence can seriously damage the energy alarm clock. Make a labeled sketch of a lightning conductor installed on an electric fence.

Mark allocation:	
Neatness	1
Correct labels for TWO different components	2
Design	1

2.2 Name THREE influences of chromium on stainless steel. (3)

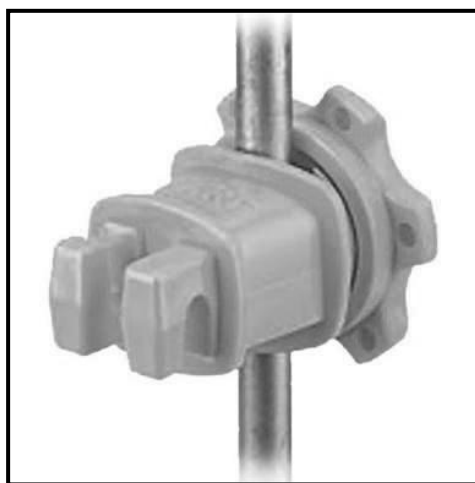
2.3 The picture below shows Teflon components.



2.3.1 Make a list of FOUR chemicals that have no effect on Teflon-coated surfaces. (4)

2.3.2 Name TWO components that can be manufactured from Teflon. (2)

- 2.4 Sales from a local parts manufacturer declined because many of the customers preferred to buy Vesconite buses instead of steel buses. Explain to the owner why it would be more profitable to manufacture and sell Vesconite buses than steel buses. (3)
- 2.5 New plastic safety signs must be installed in and around a farm's mechanical workshop. Name THREE adhesives that a farmer can use to put these safety signs on the walls. (3)
- 2.6 Describe the difference between *cohesion* and *adhesion*. (2)
- 2.7 The picture below shows a typical ceramic insulator used in electric fence installations.



- 2.7.1 Name TWO types of material that can be used as insulators between the wire and the steel pole of an electric fence. (2)
- 2.7.2 The instruction on warning signs for electric fences must be in black letters and must say the following: 'WARNING - ELECTRIC FENCE'.

Name THREE requirements of warning signs for electric fences. (3)
- 2.8 Insulation materials used in the roofs of buildings must meet certain safety requirements. Discuss FOUR of these safety requirements. (4)

(4)
[35]

QUESTION 3: ENERGY

Start this question on a NEW page.

- 3.1 The photo below shows wind turbines.



Make a list of the FOUR main components of a wind turbine. (4)

- 3.2 Name THREE factors that determine the efficiency of an electric solar panel. (3)

- 3.3 Geothermal energy is the heat energy inside the Earth that often manifests in springs, hot springs as well as volcanoes. It can therefore be very useful for generating electricity.

3.3.1 Briefly describe the procedure to be followed to harness geothermal energy and convert it into electricity. (3)

3.3.2 Name TWO important problems associated with geothermal energy. (2)

- 3.4 Biofuel is any plant or animal material that can be used as a fuel. Name FOUR disadvantages of this type of fuel. (4)

- 3.5 The picture below shows a solar geyser.

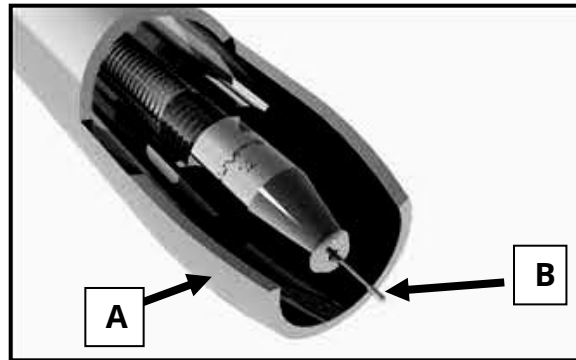


Name FOUR advantages of the solar geyser over a regular electric geyser. (4)
[20]

QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES

Start this question on a NEW page.

4.1 The picture below shows a MIG welding pipe.



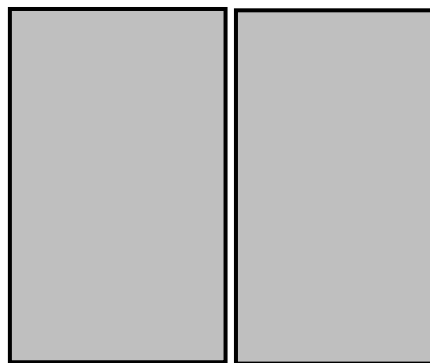
4.1.1 Identify **A** and **B**. (2)

4.1.2 Explain the function of **A** in the picture above. (2)

4.1.3 Name the material used to **B** to manufacture. (1)

4.1.4 Explain the causes of the small metal balls that form when welding with a MIG welder. (2)

4.2 The diagram below shows two pieces of metal that need to be welded together.

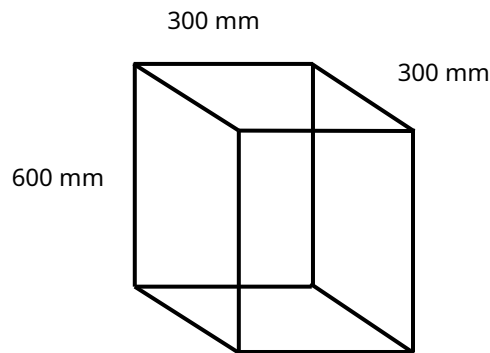


4.2.1 Briefly explain how a farmer should perform a vertical butt weld on the two pieces of metal shown above. (5)

4.2.2 Name TWO types of welding runs or patterns that a farmer can use for welding. (2)

4.3 A hole was dug to install a corner post, as shown below.

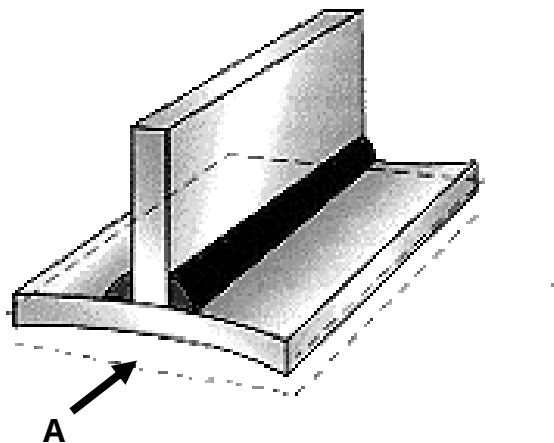
Volume of the pole = 4 700 000 mm³ Volume of
the hole = length x width x height



4.3.1 Use the information above to determine the volume of the hole minus the pole. (4)

4.3.2 Suppose the contractor wants to order precast concrete to secure the four corner posts. Calculate the volume of the concrete mix to be ordered. (3)

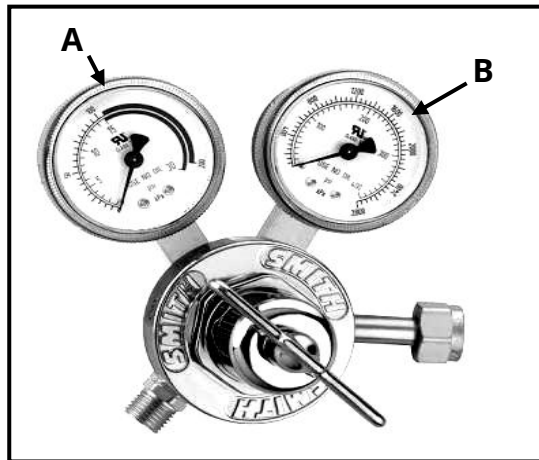
4.4 The tremendous heat created by the welding arc can cause metal parts to distort in different directions.



4.4.1 Identify the type of shrinkage associated with arrow A prevent. (1)

4.4.2 Name TWO ways to control the distortion created by the heat of welds. (2)

4.5 The picture below shows the gas regulator of an oxyacetylene device.



4.5.1 Name the functions of the two meters, **A** and **B**. (2)

4.5.2 Describe the *oxyacetylene cutting process*. (4)

4.6 The picture below shows a plasma cutting torch.



4.6.1 What kind of metal will an operator be cutting if oxygen is used? Give a reason for your answer. (2)

4.6.2 The plasma burner sometimes produces an arc; and then lose it again during the cutting process. Give the possible cause of this phenomenon and explain how you can overcome it. (2)

4.6.3 Name the material used to make the standard plasma cutting electrodes. (1)
[35]

QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT**Start this question on a NEW page.**

5.1 Describe how you will maintain the implement shown below.



(4)

5.2 The pictures below show two types of baling machines.

**A****B**

5.2.1 Copy the table below in the ANSWER BOOK. Complete the table by comparing the two balers under the given headings.

	BALE MACHINE A	BALE MACHINE B
Transport of bales		
Wrapping silage		
Handling		

(6)

5.2.2 How is bale density changed in BALE MACHINE B?

(2)

5.2.3 Discuss the function of the slip clutch inserted between the PTO shaft and the FLOW MACHINE B flywheel.

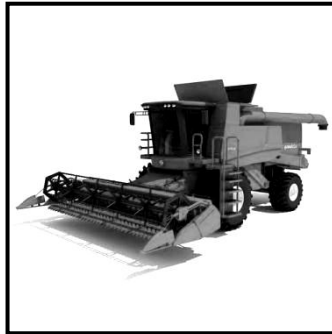
(2)

5.3 Describe THREE safety precautions that must be observed when working with the silage cutter, shown below.



(3)

- 5.4 Discuss FIVE important problems that can occur when harvesting wheat with the machine shown below.



(5)

- 5.5 The picture below shows a double-acting hydraulic cylinder.



- 5.5.1 Briefly describe how the double-acting hydraulic cylinder works. (4)

- 5.5.2 Which side of the double-acting hydraulic cylinder is the strongest? Motivate your answer. (2)

- 5.6 The picture below shows a tractor pulling a plow.



- 5.6.1 Describe THREE ways to positively change a tractor's weight displacement. (3)

- 5.6.2 What will happen if the upper rod between the tractor and the plow is removed? (2)

5.7 Carefully study the pictures of the two tractors below.



A



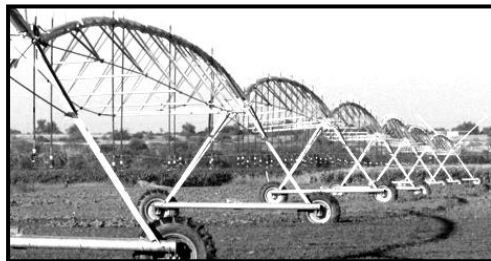
B

- 5.7.1 Select the tractor, **A** or **B**, which will be most suitable for mounting a front-loading excavator system. Motivate your answer. (3)
- 5.7.2 The power steering pumps of both tractors are powered by a V-belt drive system. Why are V-belts preferred over flat tires? (3)
- 5.7.3 Why is the exhaust pipe of the tractor longer than the air inlet pipe? (1)
- [40]**

QUESTION 6: WATER MANAGEMENT

Start this question on a NEW page.

6.1 The picture below shows a pivot irrigation system.



6.1.1 The irrigation system above needs power to power the wheels. Name TWO of these drive methods. (2)

6.1.2 Name a method to protect the metal parts of the irrigation system from rust. (1)

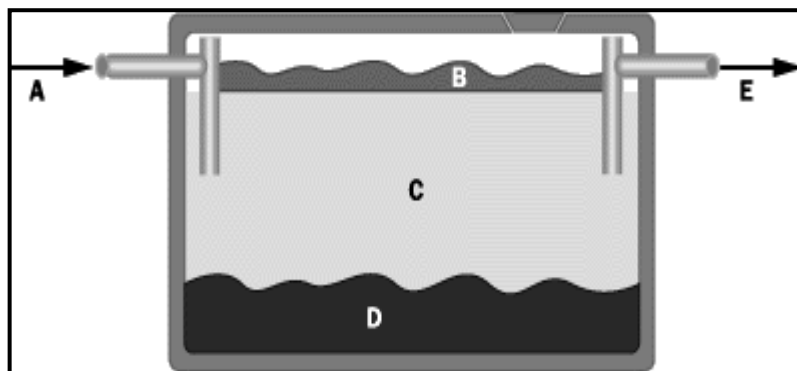
6.1.3 Give a reason why the water pressure should be kept constant from the center of the pivot point to the point of the pivot point. (2)

6.1.4 Name a device that a farmer can install to automatically turn the system on and off, as needed. (1)

6.2 Give THREE reasons for using water scheduling. (3)

6.3 Name TWO types of equipment that can be used to effectively measure evaporation transpiration of crops. (2)

6.4 The diagram below shows a wastewater management system.



6.4.1 Identify **A**, **B**, **C**, **D** and **E** shown in the diagram above. (5)

6.4.2 Describe the main function of the bacteria present in the system. (1)

6.4.3 Sewage that leaks into rivers and dams can harm people and animals. Explain the precautions to be taken when building a septic tank. (4)

6.5 Identify the water drainage system shown below.



(1)

6.6 Briefly explain how water is purified by reverse osmosis.

(3)

6.7 Name TWO communication systems that can be used to monitor the grazing patterns of livestock.

(2)

6.8 Rearrange, in the correct order, the following steps in integrating data through a Geographic Information System:

- The yield information from the monitor is recorded and stored at regular intervals.
- Geographic Information System software captures the yield data and produces yield maps.
- Install yield monitors and measuring devices on the harvesting equipment.

(3)
[30]

TOTAL SECTION B: 160
GRAND TOTAL: 200