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basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

AGRICULTURAL TECHNOLOGY

2019

MARKS: 200

TIME: 3 hours

This question paper consists of 14 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 provided 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 A safety measure when inspecting the blade of an electric lawn mower during operation:

- A Repair a broken cutter blade with a welding machine
- B Sharpen the blades with an angle grinder
- C Switch off the electricity supply to the lawn mower
- D Change the pitch of the blades

1.1.2 The tractor provides drive power to a baling machine through a ...

- A V-belt.
- B chain.
- C flat belt.
- D drive shaft.

1.1.3 The function of the ... is to adjust the cross-angle of the implement in relation to the tractor.

- A levelling box
- B top link
- C drawbar
- D sensitivity element

1.1.4 The problem with the combine harvester when maize kernels are found in the chaff that is released behind the machine:

- A The holes in the sieves are too big.
- B The blowers are set incorrectly.
- C The blades of the cutter are blunt.
- D The thresher breaks the kernels.

1.1.5 The bale density of rectangular bales can be increased by ...

- A decreasing the rate of baling.
- B decreasing the size of the baling chamber.
- C increasing the amount of hay that is fed into the baler.
- D increasing the baling speed.

- 1.1.6 A ... is used to do aerial surveillance of animal herds on the farm.
- A drone
 - B global positioning system
 - C gyroscope
 - D satellite
- 1.1.7 Using medical gloves is absolutely necessary when handling an injured person because blood can transmit ...
- A malaria.
 - B skin cancer
 - C HIV/Aids.
 - D cholera.
- 1.1.8 Pneumatic tools are driven by ...
- A oil.
 - B air pressure.
 - C water.
 - D gears.
- 1.1.9 The type of adhesive that is used for repairing a glass water tank:
- A Epoxy
 - B Silicon
 - C Resorcinol
 - D Latex
- 1.1.10 The farmer and the workers must be familiar with the ... Act that regulates workshop safety regulations.
- A Labour Relations (LR)
 - B Occupational Health and Safety (OHS)
 - C DOE
 - D SABS
- (10 x 2) (20)

1.2 Change the UNDERLINED word(s) in each of the following statements to make the statements TRUE. Write only the word(s) 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 The inert gas used in MIG welding serves as a welding puddle.

1.2.2 The tip of a MIG welding torch is covered with a rubber spout that directs the flow of gas.

1.2.3 Bio-energy from deep beneath the earth surface is used to heat water and produce steam for power stations.

1.2.4 Cooking utensils are covered with Vesconite to make them heat resistant.

1.2.5 Zinc is used as coating on the surface of steel to prevent food cans from corroding. (5 x 2) (10)

1.3 Choose a word/term from COLUMN B that matches the description in COLUMN A. Write down 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 I.

COLUMN A		COLUMN B	
1.3.1	A type of hydraulic cylinder installed on the blade of a bulldozer	A	single action
		B	adhesion
1.3.2	Ability of the molecules of an adhesive to cling to the molecules of other substances	C	380 volts
		D	double action
1.3.3	The voltage of an electric fence may never exceed this voltage	E	reverse osmosis
1.3.4	The process whereby water is sent through two different liquids separated by a permeable film	F	cohesion
		G	10 000 volts
1.3.5	The minimum voltage for a three-phase electric motor	H	distillation

(5 x 2) (10)

TOTAL SECTION A: 40

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

- 2.1 State THREE influences that nickel, as an alloy element, has on stainless steel. (3)
- 2.2 Brass is an alloy of copper and zinc with a buttery yellow colour and specific properties.
- 2.2.1 Give THREE applications of brass on the farm. (3)
- 2.2.2 Name and explain the method that must be used to relieve internal stresses in brass. (3)
- 2.2.3 Name a welding method that can be used to join two pieces of brass by using an oxyacetylene flame. (1)
- 2.3 State TWO properties of bronze. (2)
- 2.4 A metal alloy is a mixture of two or more elements.
- 2.4.1 Name the alloy material that is formed when mixing tin and copper. (1)
- 2.4.2 Briefly describe TWO advantages of a tin/copper alloy over pure copper. (2)
- 2.5 A hole in a canvas canopy must be repaired with a patch and an adhesive.
- 2.5.1 Describe TWO methods that can be used to improve the cohesion properties of an adhesive. (2)
- 2.5.2 Distinguish between *duration of cohesion* and *duration of usability*. (2)
- 2.6 Give TWO reasons for using casting resins in underground electrical cable joints. (2)
- 2.7 Give TWO reasons for coating automobile wiper blades with Teflon. (2)

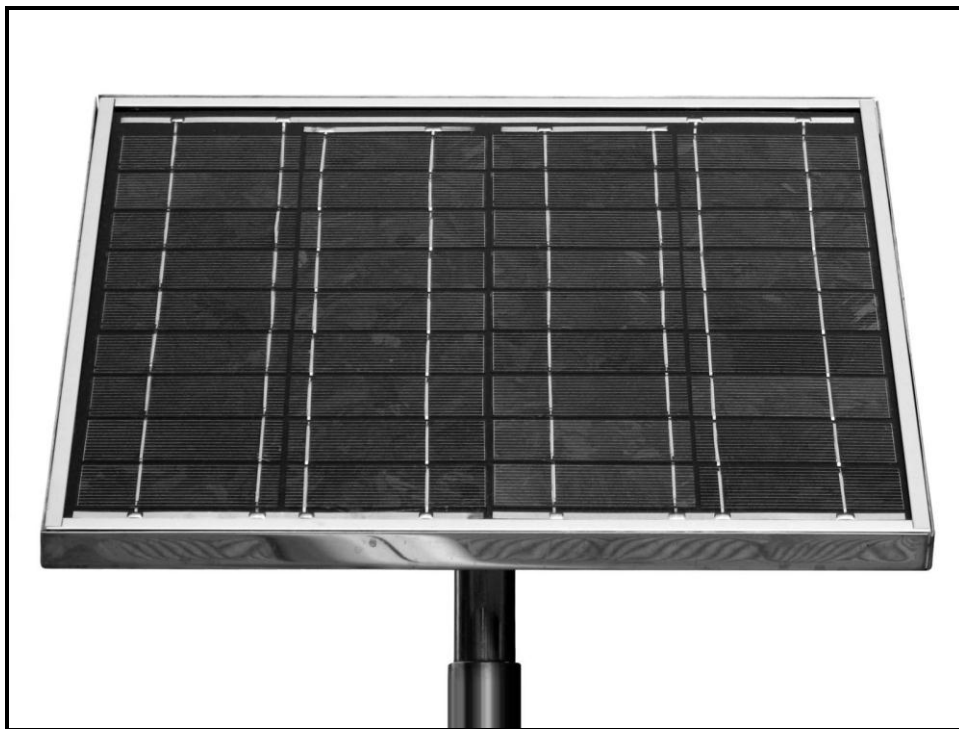
2.8 Electric safety fences, as shown below, are designed to secure property.



- 2.8.1 Describe TWO ways of increasing the earth efficiency of the electric fence in poor earth conditions. (2)
- 2.8.2 Name TWO soil conditions that have a negative influence on the earth return system of an electric fence. (2)
- 2.8.3 Name TWO materials that can be used as insulators on an electric fence. (2)
- 2.8.4 State the general rule for the use of barbed wire as an electric fence material. Give a reason for this rule. (2)
- 2.9 List FOUR characteristics of glass fibre. (4)
- [35]**

QUESTION 3: ENERGY**(Start this question on a NEW page.)**

- 3.1 Name THREE disadvantages of using wind as a source for producing electric energy. (3)
- 3.2 How can the direct current of a wind turbine be changed into alternating current? (1)
- 3.3 The picture below shows a photovoltaic solar system. Explain the process of producing electricity with this device.



- 3.4 Name TWO different appliances that use the heat from solar energy. (2)
- 3.5 Discuss the working of a geothermal energy power station. (5)
- 3.6 Give FOUR reasons why biofuel is known as environmentally friendly. (4)
- 3.7 Name TWO fuels that can be manufactured from organic plant material. (2)
- [20]**

QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES**(Start this question on a NEW page.)**

4.1 The picture below shows a person welding with a MIG welder.



4.1.1 Describe a problem that may occur when welding with a MIG welder under windy conditions. (1)

4.1.2 Name TWO adjustments that can be made when welding with the MIG welder to prevent windy conditions from having an influence on the welding process. (2)

4.1.3 Name THREE adjustments that must be made on the MIG welder before the welding process commences. (3)

4.2 The sketch below shows a defective welding joint made with a MIG-welding machine.



4.2.1 Identify the welding defect above. (1)

4.2.2 Recommend TWO welding measures to prevent this welding defect. (2)

4.3 Cast-iron welding is a very difficult process and the operator can easily damage the work piece beyond repair if he/she does not have the necessary welding skill.

4.3.1 Name the type of welding rod that must be used when welding cast iron. (1)

4.3.2 Give the reason for preheating cast iron before the welding process starts. (1)

4.3.3 State TWO actions that must be performed with an angle grinder on the cast iron work piece before the start of the welding proses. (2)

4.4 You have been instructed to manufacture burglar proofing for a window of a tool shed. The measurements of the windows are 1 200 mm x 900 mm. The burglar proofing must consist of a square tubing frame and $\varnothing 12$ mm round bars. The spaces between the round bars must be 90 mm. The price of the square tubing is R30,00/m and the $\varnothing 12$ mm round bar is R8,00/m.

4.4.1 Draw a plan of the burglar proofing according to the measurements provided.

Marks will be allocated as follow:

Measurements	(1)
Correct number of round bars	(1)
Scale	(1)

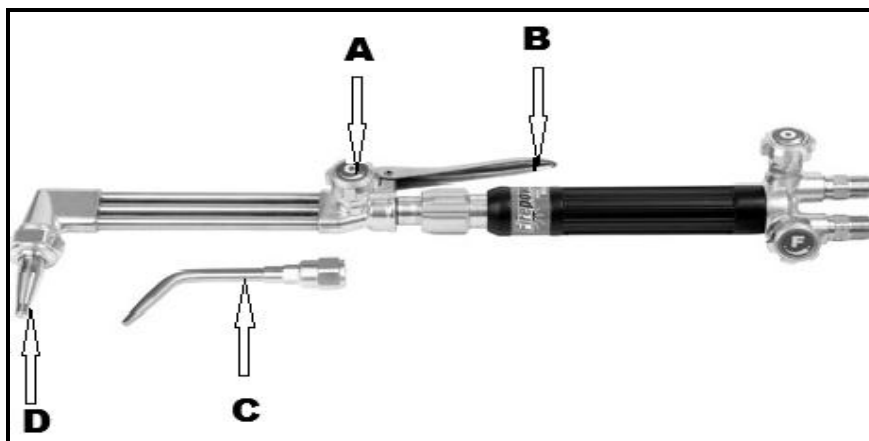
(3)

4.4.2 Prepare a material list of all the metal that is needed for the project. (2)

4.4.3 Calculate the total cost of the metal needed. (5)

4.5 Name FOUR personal safety hazards when working with a plasma cutting machine and recommend a preventative measure for each. (8)

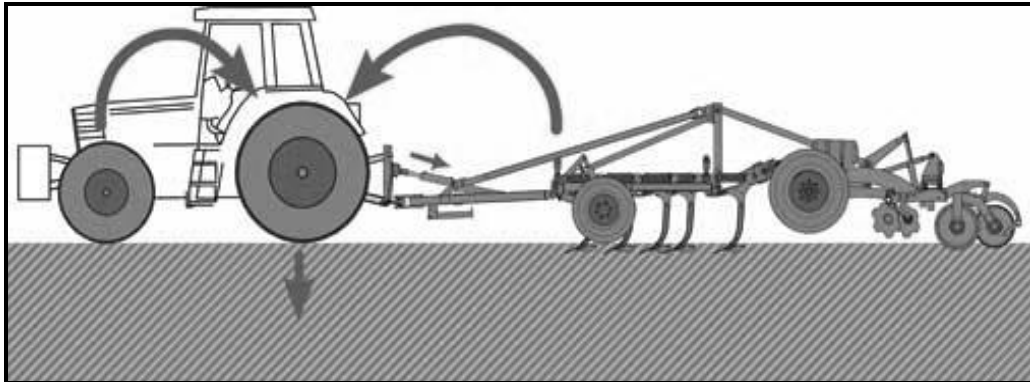
4.6 Label the FOUR parts, **A** to **D**, of the oxyacetylene apparatus below.



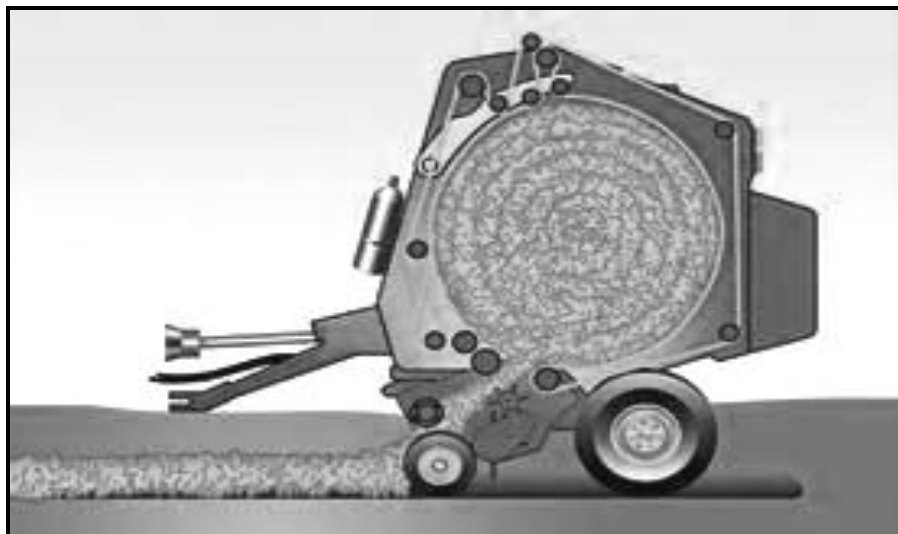
(4)
[35]

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

- 5.1 The picture below shows the influence that an implement has on the forward movement of a tractor.



- 5.1.1 Describe TWO ways in which the mass displacement of a tractor can be positively influenced. (2)
- 5.1.2 Name THREE factors that have an influence on the depth control system of a tractor. (3)
- 5.2 The picture below shows a Vermeer type round baling machine.



- 5.2.1 Briefly explain the bale forming process in the Vermeer baling machine system up to the point where the binding of the bale takes place. (6)
- 5.2.2 Briefly discuss FIVE procedures that must be followed before the baling machine is stored for a long period at the end of the season. (5)
- 5.2.3 Name THREE instances where a slip clutch will protect an implement during normal operation. (3)

- 5.3 The picture below shows a front-end loader. Name FIVE measures to prevent accidents from happening when using this machine.



(5)

- 5.4 Discuss the role of computers and satellite positioning systems in modern combine harvesters similar to the one below.



(4)

- 5.5 Draw and label the THREE types of gears that can be used in tractor gearboxes. (6)
- 5.6 Name the THREE types of power take-off (PTO) drive shafts that can be found on tractors. (3)
- 5.7 Give THREE examples of running expenses in a farm workshop. (3)

[40]

QUESTION 6: WATER MANAGEMENT**(Start this question on a NEW page.)**

- 6.1 Describe FIVE disadvantages of a lateral move irrigation system. (5)
- 6.2 Below is an aerial photograph of irrigation fields.



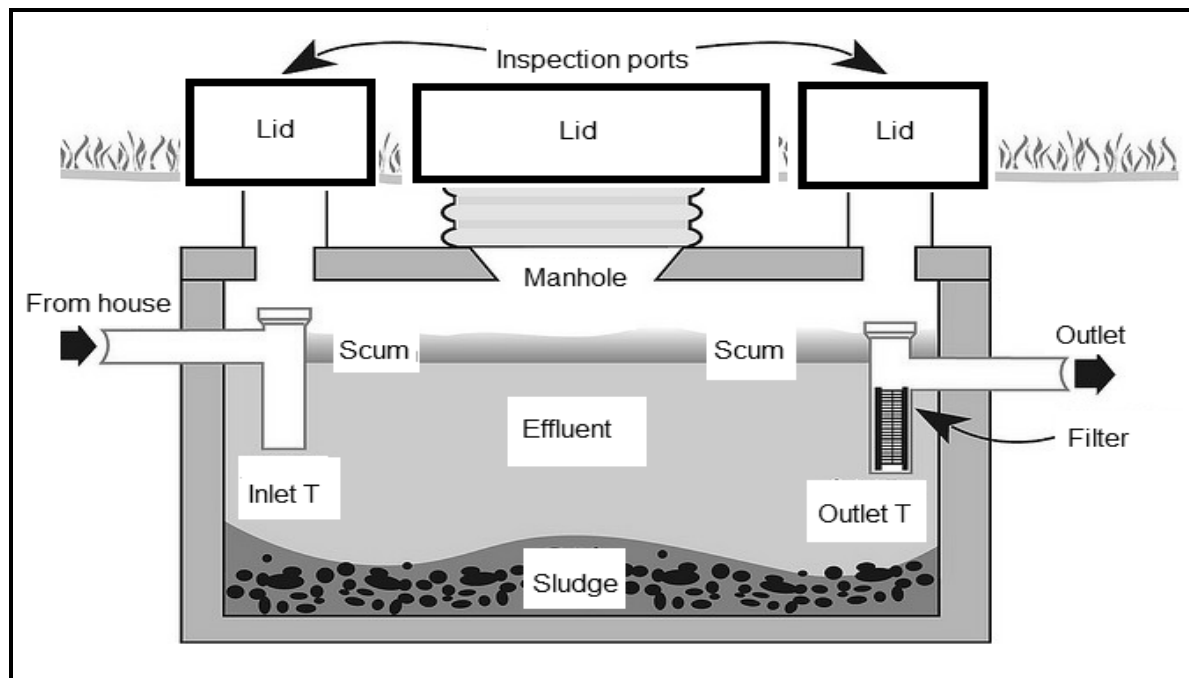
- 6.2.1 Explain THREE reasons why a centre-pivot irrigation system is known as a labour-saving system. (3)
- 6.2.2 State THREE instances where the safety switch will automatically disconnect the electricity supply to the electric motors of the drive wheels on the centre-pivot irrigation system. (3)
- 6.2.3 A field must be irrigated with a centre pivot irrigation system. Calculate the surface area (m^2) of the field if the diameter of the centre pivot is 200 m.

The following formula may be used:

$$\text{Area} = \pi \times r^2 \quad \text{using } \pi = 3,14 \quad (4)$$

- 6.3 Describe THREE financial implications of over-irrigation. (3)
- 6.4 Name THREE basic types of irrigation timers which can be used to regulate water delivery. (3)

- 6.5 The diagram below shows a septic tank used on the farm to clean household sewerage.



- 6.5.1 Why does the sludge in the septic tank remain on the bottom? (1)
- 6.5.2 State the function of the filter. (1)
- 6.5.3 Give a reason why the outlet pipe is installed at a lower level than the inlet pipe. (1)
- 6.5.4 Give a reason why a lid is installed above both the inlet T and outlet T pipes. (1)
- 6.5.5 Name TWO functions of the bacteria in a septic tank. (2)
- 6.6 Explain the working of a distiller in a water purification system. (3)

[30]

TOTAL SECTION B: 160
GRAND TOTAL: 200