



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

AGRICULTURAL TECHNOLOGY

NOVEMBER 2018

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 method to protect the rotor of a wind turbine from mechanical damage during strong winds:
- A Disengage the gearbox.
 - B Turn the head towards the wind.
 - C Change the pitch of the blades.
 - D Use the hydraulic brake.
- 1.1.2 ... is a semi-conductive material used in the manufacturing of a solar cell.
- A Perspex
 - B Rubber
 - C Brass
 - D Silicon
- 1.1.3 The function of the inserted gas used during MIG welding is to ...
- A cool the welded joint.
 - B shield the welding run from oxygen.
 - C warm the metal to be welded.
 - D blow away the slag.
- 1.1.4 The U-shaped pipes of centre-pivot irrigation systems on which the sprayers hang are generally known as ...
- A elbows.
 - B extensions.
 - C jets.
 - D goose necks.
- 1.1.5 Which ONE of the following processes can NOT be used to join copper pipes?
- A Hard soldering
 - B MIG welding
 - C Silver soldering
 - D Soft soldering

- 1.1.6 Which ONE of the following is NOT considered to be a running cost with regard to tractor expenses?
- A Depreciation
 - B Labour
 - C Repairs
 - D Supervisor expenses
- 1.1.7 ... smoke from an exhaust indicates that water is leaking into the combustion chamber of the engine.
- A Blue
 - B Black
 - C White
 - D Grey
- 1.1.8 A function of the differential lock on a tractor:
- A Disconnects both wheels in an emergency
 - B Disconnects the gearbox from the engine
 - C Prevents one of the wheels from sliding
 - D Allows the tractor to reverse
- 1.1.9 A ... is NOT used when a plough is connected to a tractor.
- A top link
 - B lifting arm
 - C universal joint
 - D stabiliser chain
- 1.1.10 Which ONE of the following is NOT harmful to the operator when cutting with a plasma cutting apparatus?
- A Inert shielding gas
 - B Ultraviolet radiation
 - C Poisonous welding gases
 - D Hot metal sparks
- (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 A venturi regulates the flow of water in one direction.

1.2.2 The tension of the baler is the exact moment when the needles of the ram-type baler lift the binding rope so that the compressed hay can be bound.

1.2.3 A generator is used to change direct current to alternating current.

1.2.4 The rotor facilitates the feeding process into the hammer mill.

1.2.5 Lubrication for a bearing is added through a grease nozzle. (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	The most common friction material that can be used as a clutch plate lining	A	asbestos
		B	brass
1.3.2	A low viscosity fluid that can be transformed to a tough flexible solid by adding a hardening agent	C	resin
		D	glass fibre
1.3.3	The material suitable for the manufacturing of ship propellers due to its resistance to seawater corrosion	E	polystyrene
		F	porcelain
		G	rubber
1.3.4	This material is used to make the hull of a ski boat	H	bronze
1.3.5	A material used in the manufacturing of irrigation sprinkler heads		

(5 x 2) (10)

TOTAL SECTION A: 40

SECTION B**QUESTION 2: MATERIALS AND STRUCTURES**

(Start this question on a NEW page.)

2.1 Knowledge of the different metals that are used on a farm is important for successful manufacturing and maintenance processes.

2.1.1 Name TWO alloy elements that decrease magnetism in stainless steel. (2)

2.1.2 State THREE properties of copper. (3)

2.1.3 Describe TWO requirements that determine the composition of brass. (2)

2.1.4 State THREE properties of tin. (3)

2.2 Answer the questions below that refer to adhesives.



2.2.1 Describe the term *elasticity* with regard to adhesives. (2)

2.2.2 Recommend THREE methods to improve the strength of an adhesive. (3)

2.3 Name THREE safety aspects which must be considered when working with glass fibre. (3)

2.4 State THREE advantages of Vesconite. (3)

2.5 Name THREE substances that do NOT have an influence on Teflon coating. (3)

2.6 Insulation material used in the roofs of farm buildings must adhere to certain safety standards. Name THREE of these safety standards. (3)

- 2.7 Proper safety fences play an important role in farm security.
- 2.7.1 Identify THREE causes of short circuits that can appear on electric fences. (3)
- 2.7.2 Where must safety signs be placed on an electric fence, according to safety regulations? (2)
- 2.7.3 State THREE functions of the material that covers underground electric cables. (3)
- [35]**

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

- 3.1 Study the photograph of a wind turbine below and answer the questions that follow.



- 3.1.1 Explain to a farmer FOUR requirements of a suitable location to install a wind turbine. (4)
- 3.1.2 Describe THREE advantages of wind energy. (3)
- 3.2 State FOUR factors that will have a negative influence on the efficiency of a photovoltaic solar panel system. (4)
- 3.3 Name TWO problems that can be associated with the generation of geothermal energy. (2)
- 3.4 Describe the material that is suitable for the manufacturing of biofuel. (2)
- 3.5 Name TWO processes that are used in the manufacturing of ethanol. (2)
- 3.6 Describe THREE advantages of methanol as an alternative fuel. (3)
- [20]**

QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES

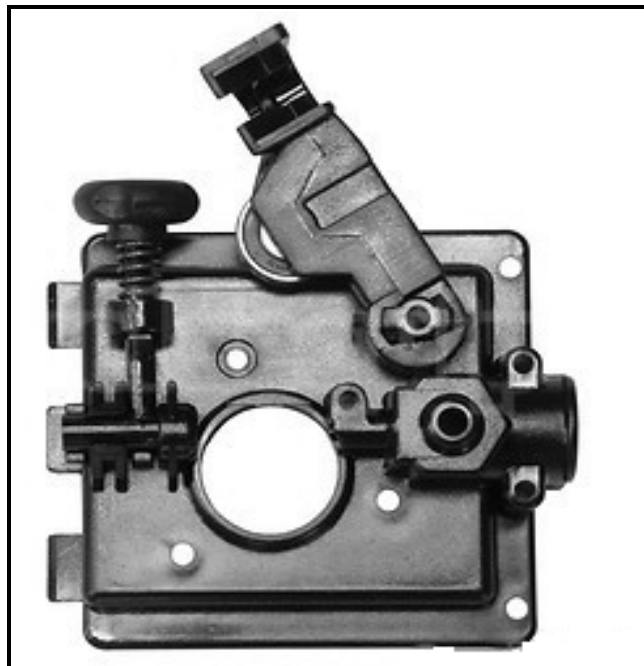
(Start this question on a NEW page.)

4.1 Redraw the table below in your ANSWER BOOK. Complete the table by comparing MIG welding with arc welding using the given headings.

HEADINGS	MIG WELDING	ARC WELDING
Welding speed		
Formation of slag after welding		
Start-up cost of equipment		
Working in windy conditions		

(8)

4.2 The picture below shows a part of a MIG-welding machine.



4.2.1 Describe the function of the part shown above. (2)

4.2.2 Briefly describe FIVE safety measures that must be followed when welding with the MIG-welding machine. (5)

4.3 Name THREE different types of welding movements that can be considered when making an arc-welding run AND make a neat drawing of EACH welding figure. (6)

4.4 Describe the cutting procedure that must be followed to ensure a safe and clean cut when cutting a 10 mm steel plate with an oxyacetylene set. (4)

- 4.5 Explain the influence that water or moisture has on the nozzle of the plasma-cutting apparatus below.



(2)

- 4.6 A kraal is needed for handling cattle.

Design a cattle-handling facility consisting of ONE big holding kraal, THREE smaller kraals, ONE crush pen and functional gates. The cattle-handling facility must be able to accommodate at least 50 cattle.

INSTRUCTIONS:

- Your design must be effective and functional.
- The gates must ensure the effective handling of the cattle.
- The crush pen must be positioned in such a way that the cattle can easily enter without excessive handling.
- Your design must facilitate effective and quick handling of the cattle.

(8)
[35]

QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT

(Start this question on a NEW page.)

5.1 The picture below shows a plough connected to a tractor.



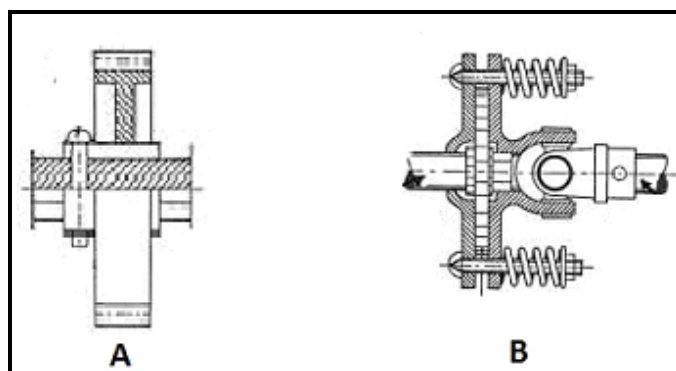
5.1.1 Name and explain THREE factors that have an influence on the depth control system of a tractor. (6)

5.1.2 State THREE items on a tractor that the driver must inspect before starting the tractor. (3)

5.2 Describe FIVE advantages of modern combine harvesters over manual harvesting methods. (5)

5.3 Name FOUR requirements that safety screens on farm machinery must comply with. (4)

5.4 Diagrams **A** and **B** below show two different safety devices that are installed on farm machines.



5.4.1 Choose the correct device (**A** or **B**), found on a ripper, to protect the teeth from breaking when it gets stuck behind a big rock or plant root. (1)

5.4.2 State THREE functions of the slip clutch found in the drive mechanism of a baler. (3)

5.4.3 Name the part in diagram **B** that enables the drive shaft connected to the slip clutch to work at an angle. (1)

5.5 State FIVE factors that must be taken into consideration when planning the purchase of a new tractor. (5)

5.6 Redraw the table below in your ANSWER BOOK. Complete the table by comparing V-belts and flat belts under the headings that are given.

HEADINGS	V-BELT	FLAT BELT
Ease of installation		
Use over long distances		
Lengthened or shortened		
Slip on pulleys under tension		

(8)

5.7 Discuss in detail the effect that the presence of air has on the working of a hydraulic system. (4)

[40]

QUESTION 6: WATER MANAGEMENT

(Start this question on a NEW page.)

6.1 The pictures below show TWO types of irrigation systems (**A** and **B**).



A



B

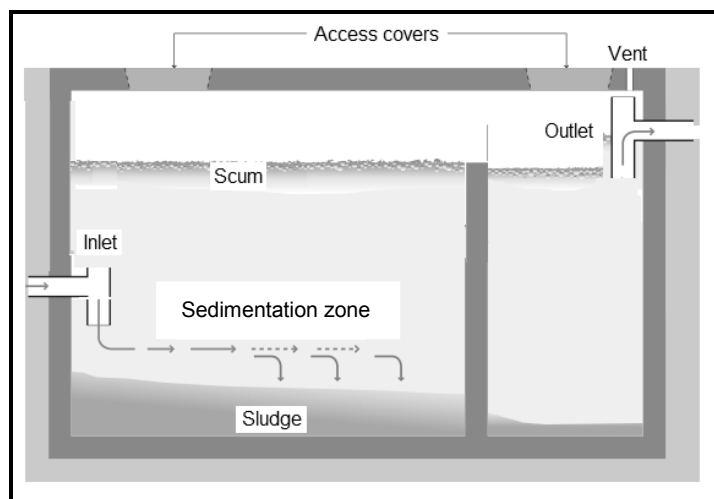
State THREE advantages of system **A** over system **B**. (3)

6.2 Name THREE data sources that the irrigation management mechanism – smart controller – uses to determine local weather conditions. (3)

6.3 Recommend what a farmer should consider before choosing a type of irrigation system for a piece of land. (3)

6.4 Name THREE instances where flood irrigation would be preferred over sprinkler irrigation. (3)

6.5 Study the illustration of a septic tank drainage system below.



6.5.1 Identify the mistakes in the design drawing of the septic tank above. (2)

6.5.2 Name THREE items that must NOT be flushed down a septic tank drainage system. (3)

6.5.3 What will happen in a septic tank drainage system if the bacteria are destroyed? (2)

- 6.6 Name TWO factors that determine the cleaning of a septic tank. (2)
- 6.7 Calculate the flow rate (litres per minute) in a water-delivering system if it takes 40 minutes to fill a 20 kℓ (kilolitre) tank to the top. (Show ALL calculations.)
- Use the formula: Flow rate = $\frac{\text{capacity}}{\text{time}}$ (4)
- 6.8 Give ONE function of EACH of the following devices:
- 6.8.1 GPS (1)
- 6.8.2 GIS (1)
- 6.8.3 VRT (1)
- 6.9 Name TWO components of the whole house water filtering system that must be checked and replaced on a regular basis. (2)

[30]

TOTAL SECTION B: 160
GRAND TOTAL: 200