



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**AGRICULTURAL TECHNOLOGY**

**NOVEMBER 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 correct 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 B.

- 1.1.1 ... refer(s) to the major factors of risk assessment.
- A The possibility and seriousness of an incident
  - B Common sense and information on accidents in the past
  - C Eliminating danger or finding safer alternatives
  - D Protecting and training workers
- (2)
- 1.1.2 ... is/are a safety hazard on a farm and classified as a biological danger.
- A Radiation
  - B Bacteria
  - C Workload
  - D Pesticides
- (2)
- 1.1.3 ... will improve the welding characteristics of stainless steel.
- A Manganese
  - B Nickel
  - C Lead
  - D Chromium
- (2)
- 1.1.4 This device CANNOT be used for the monitoring of cattle grazing patterns on a farm:
- A GPS collar
  - B GPS chip implant
  - C RFID ear tag
  - D Drone
- (2)
- 1.1.5 The ... irrigation system may lead to soil erosion if not efficiently controlled.
- A drip
  - B micro-
  - C flood
  - D mist
- (2)

- 1.1.6 A fast and reliable method for an employer to communicate with a large number of employees:
- A Social media
  - B Printed media
  - C The post office
  - D Morse code
- (2)
- 1.1.7 The input shaft of a gearbox is connected directly to the ...
- A clutch plate.
  - B pressure plate.
  - C release bearing.
  - D flywheel.
- (2)
- 1.1.8 A material that is highly heat resistant and prevents food from sticking to the surface area of cooking utensils:
- A Teflon
  - B Molybdenum
  - C Vesconite
  - D Vermiculite
- (2)
- 1.1.9 A/An ... system is commonly used to power air equipment in workshops and to assist with the braking systems of trucks.
- A electric
  - B hydraulic
  - C magnetic
  - D pneumatic
- (2)
- 1.1.10 The ... power plant works on the same principle as the wind generator. The only difference is that moving water turn the turbine instead of wind power.
- A nuclear
  - B hydro
  - C geothermal
  - D photovoltaic
- (2)

1.2 Change the UNDERLINED word(s) in each of the following statements below to make them 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 Baling machine.

- 1.2.1 A solid membrane allows only water to pass through on a molecular level during reverse osmosis. (2)
- 1.2.2 The baling chamber of the square baler is initially small but increases in size as the hay is fed into the baling chamber. (2)
- 1.2.3 The only way of preventing a hammer mill from vibrating excessively is to balance the hopper. (2)
- 1.2.4 The three-point mechanism of a tractor works with air. (2)
- 1.2.5 Hard soil has a neutral effect on a tractor's fuel consumption when ploughing. (2)

1.3 Choose a description from COLUMN B that matches the word/term 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	Porosity	A	rusted plate
1.3.2	Lack of penetration	B	insufficient preheating
1.3.3	Spatter	C	wrong nozzle angle
1.3.4	Undercutting	D	electric current too low
1.3.5	Cracking	E	insufficient gas flow
		F	correct technique
		G	lack of tack welding
		H	zinc-coated plate

(5 x 2) (10)

**TOTAL SECTION A: 40**

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

Start this question on a NEW page.

- 2.1 Use the different materials below that are important for successful manufacturing processes on the farm to answer the questions that follow.

copper; aluminium; stainless steel; mild steel; brass
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- 2.1.1 Which ONE of the metals above can be used effectively for soldering? (1)
- 2.1.2 Identify the metal that is best suited for the installation of warm-water pipes in a farmhouse. (1)
- 2.1.3 Name the material that is used to manufacture the foil to cover food products. (1)
- 2.1.4 Give THREE reasons why stainless steel is the best material to manufacture food-processing equipment. (3)
- 2.2 Name THREE factors to take into consideration when identifying tin. (3)
- 2.3 Describe TWO advantages of a tin/copper alloy when it is compared to pure copper. (2)
- 2.4 State TWO properties of bronze. (2)
- 2.5 In the photograph below a person is repairing a shoe with an adhesive.



- State TWO important aspects to take into consideration when an adhesive must be chosen for a specific application. (2)
- 2.6 Name FOUR precautionary measures that must be followed when working with glass fibre. (4)

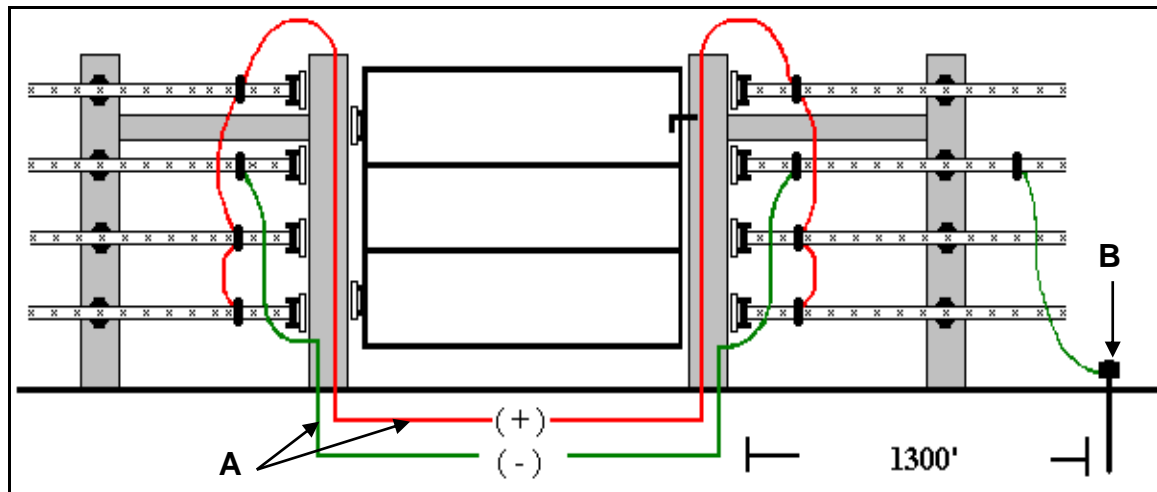
2.7 Below is a picture of a Vesconite bush fitted into the casing of a boat propeller.



State FOUR properties that make Vesconite a suitable material to be used in marine applications.

(4)

2.8 The illustration below is a design drawing of an electric fence on a farm to keep animals secure.



2.8.1 Explain the function of the electric wires at **A**.

(2)

2.8.2 Name the component of the electric fence at **B** and explain its function.

(2)

2.8.3 Name FOUR safety precautions applicable to electric fencing on a farm.

(4)

2.8.4 Discuss the procedure that must be followed when the earth system of an electric fence is being tested.

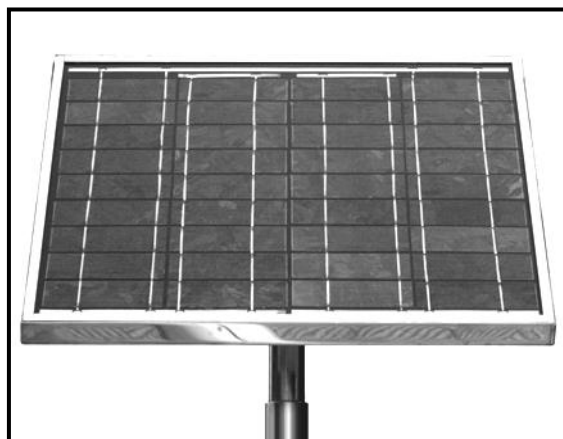
(4)

[35]

**QUESTION 3: ENERGY**

Start this question on a NEW page.

- 3.1 The picture below shows a solar panel system commonly used on farms for generating electricity.



- 3.1.1 Explain how electricity is generated with this solar panel. (5)
- 3.1.2 Give FOUR possible reasons why a solar panel does not function to its full potential. (4)
- 3.2 Explain the working of a geothermal power station from the moment that a geothermal energy source is discovered to the point that electricity is delivered by the power station. (5)
- 3.3 State THREE advantages of wind as an alternative energy source for a farmer with no access to the national electricity grid. (3)
- 3.4 Name TWO types of vegetable oils that can be used economically in the manufacturing of biofuel. (2)
- 3.5 A large quantity of methane gas was recently discovered along the coast of South Africa. Name the alternative fuel that can be manufactured from this earth gas to supplement gasoline. (1)
- [20]**



**QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES**

Start this question on a NEW page.

- 4.1 Study the picture of a MIG welding machine below and answer the questions that follow.



- 4.1.1 Name the steps that must be followed when replacing the damaged contact tip of the MIG handset. (5)
- 4.1.2 State THREE disadvantages of MIG welding. (3)

4.2

**SCENARIO**

You have been requested to manufacture a floor grid for a cattle trailer. This floor grid must prevent the cattle from slipping and injuring themselves on the slippery surface of the trailer.

The outside measurements of the floor grid are 3 000 mm (long) and 2 100 mm (wide). The outer frame of the grid must be constructed from 30 mm x 5 mm flat bar. The price of the flat bar is R5,00 per metre. The inside of the grid should be constructed from Ø 8 mm mild steel rods. The spaces between adjacent rods must be 150 mm. The price of the Ø 8 mm rods is R3,00 per metre.

Draw a neat sketch of the floor grid with all the parts in the scenario above.

Marks will be allocated for the following:

- 4.2.1 Neatness of the sketch (1)
- 4.2.2 ONE measurement (1)
- 4.2.3 ONE type of welding joint (1)
- 4.2.4 A material list (4)
- 4.2.5 Cost calculation of the material used in the manufacturing of the grid (3)

- 4.3 Explain the term *hard facing* of worn parts. (2)
- 4.4 Describe the overhead arc-welding process from the moment that the arc is struck. (5)
- 4.5 Below are pictures showing a plasma-cutting apparatus (A) and an oxyacetylene cutting apparatus (B).



A



B

- 4.5.1 State FOUR advantages of using a plasma-cutting apparatus. (4)
- 4.5.2 Describe the cutting process when using an oxyacetylene apparatus. (3)
- 4.5.3 Name THREE types of metals that can be cut with an oxyacetylene cutting apparatus. (3)

[35]

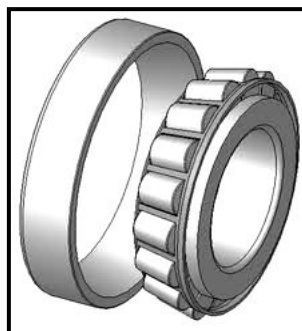
**QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT**

Start this question on a NEW page.

- 5.1 Discuss FIVE safety precautions that must be considered when working with the ride-on lawn mower. (5)
- 5.2 The picture below shows a round baling machine.

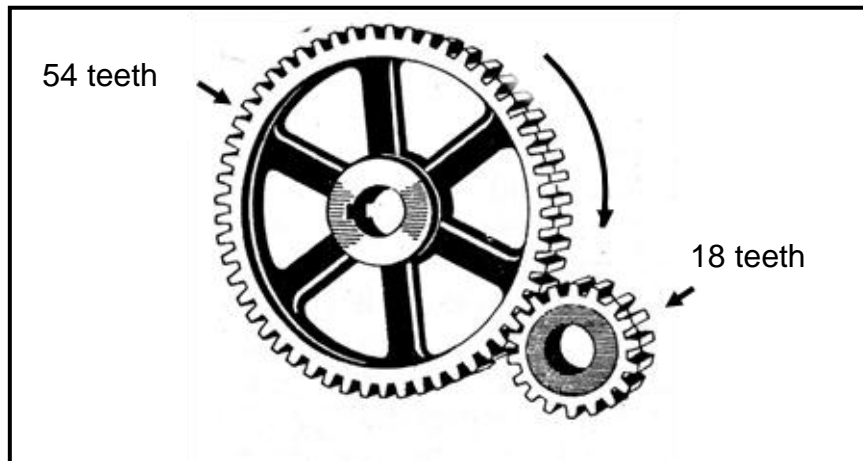


- 5.2.1 Name the part that is fitted between the tractor and the baling machine that provides drive when needed. (1)
- 5.2.2 Describe the maintenance of this machine at the end of the baling season. (5)
- 5.2.3 Describe the working and construction of the universal joint that is installed in the drive mechanism of this machine. (3)
- 5.2.4 Which type of hydraulic cylinder will be used for the lifting and lowering of the pick-up wheel of the baling machine? Motivate your answer. (3)
- 5.3 The picture below shows a typical bearing.

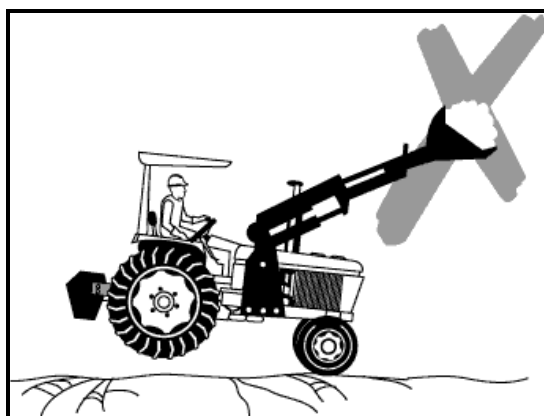


- 5.3.1 State the function of the bearing above. (2)
- 5.3.2 Describe the points to consider when maintenance and lubrication is carried out on bearings. (2)

- 5.4 State THREE precautionary measures to take for the safe transportation of tractors on public roads. (3)
- 5.5 The gears below are used in a combine harvester to provide drive to a certain system.



- 5.5.1 Calculate the gear ratio if the large drive gear has 54 teeth and the small driven gear has 18 teeth. (Show ALL calculations.) (4)
- 5.5.2 In which direction will the small gear turn if the large gear turns clockwise? (1)
- 5.5.3 What can be done to allow the two gears to turn in the same direction? (1)
- 5.6 Give THREE reasons why a differential is installed in the rear axle of a tractor. (3)
- 5.7 Name TWO running expenses for a tractor that must be considered when drawing up a farm budget. (2)
- 5.8 Study the illustration below and explain why it is better for the operator to keep the bucket low rather than lifting it up to the highest point when moving the load over long distances.



(5)  
[40]

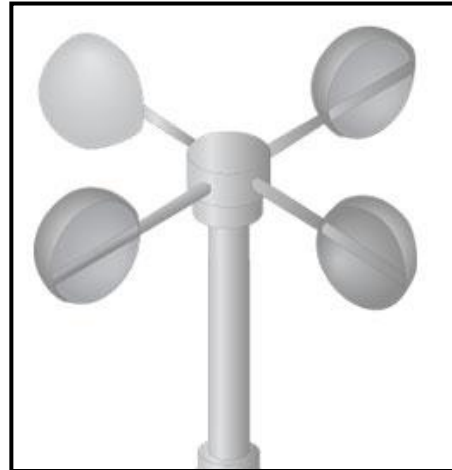
**QUESTION 6: WATER MANAGEMENT**

Start this question on a NEW page.

6.1 Identify the instruments below that are used for irrigation scheduling.



**A**



**B**

(2)

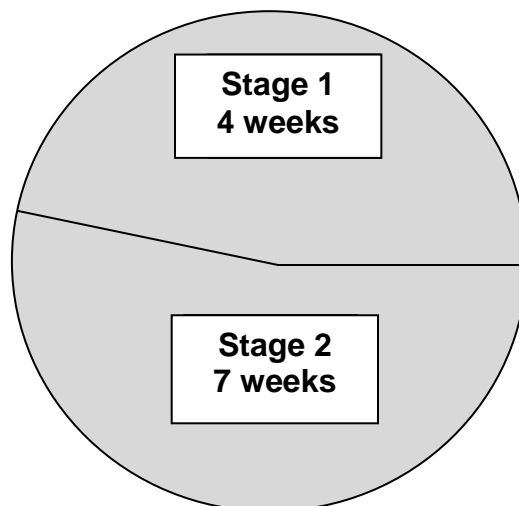
6.2 State THREE general problems that are experienced with irrigation in the commercial farming sector.

(3)

6.3 State TWO instances where a travelling sprinkler gun/canon spray will be better than the side roll irrigation system.

(2)

6.4 The diagram below shows different growth stages of lucerne under a centre-pivot irrigation system.



6.4.1 Give TWO reasons for dividing irrigation fields into zones by referring to the data above.

(2)

6.4.2 What type of control system can be used on the centre-pivot irrigation system to supply different quantities of water effectively to the different zones?

(1)

- 6.5 Give THREE reasons why a centre-pivot irrigation system runs out of line. (3)
- 6.6 Name the THREE soil moisture testing methods that a farmer can consider when testing if the quantity of water supplied by an irrigation system is adequate. (3)
- 6.7 Untreated household sewerage can cause major health hazards to a farmer when it leaks into the underground water aquifer.
- 6.7.1 State FIVE major components of a household sewerage treatment system. (5)
- 6.7.2 Explain the cause of the destruction of micro-organisms in a household sewerage system. (5)
- 6.8 Describe the construction of a French drain. (2)
- 6.9 Explain to a farmer why he/she should be able to determine the flow rate in a water delivery pipe. (2)
- [30]**
- TOTAL SECTION B: 160**  
**GRAND TOTAL: 200**