



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

AGRICULTURAL TECHNOLOGY

EXEMPLAR 2014

MARKS: 200

TIME: 3 hours

This question paper consists of 12 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.
2. SECTION A: MULTIPLE-CHOICE QUESTIONS
 - 2.1 This section consists of THREE questions.
 - 2.2 Follow the instructions when answering the questions.
3. SECTION B: STRUCTURED QUESTIONS
 - 3.1 This section consists of FIVE questions.
 - 3.2 Number the answers correctly according to the numbering system used in this question paper.
 - 3.3 Start EACH question on a NEW page.
 - 3.4 Non-programmable calculators may be used.
 - 3.5 It is in your own interest to pay attention to the accuracy and neatness of your work.

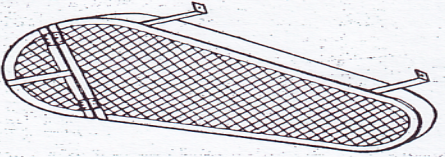

SECTION A**QUESTION 1**

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 number (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 B.

- 1.1.1 ... is an example of a non-ferrous metal.
- A Bronze
 - B Tungsten steel
 - C Chromium steel
 - D Stainless steel
- (2)
- 1.1.2 The power output of a solar array is measured in ...
- A volt.
 - B watt.
 - C ohm.
 - D ampere.
- (2)
- 1.1.3 Nitrogen and ... are key pollutants found in runoff water from irrigation.
- A carbon
 - B oxygen
 - C phosphorus
 - D salmonella
- (2)
- 1.1.4 The ram baler bales grass into ...
- A big round bales.
 - B small round bales.
 - C rectangular bales.
 - D square bales.
- (2)
- 1.1.5 Hardness as a property of metal is the ...
- A ability to be stretched into fine wire without fracture.
 - B resistance to deformation, bending and cutting.
 - C toughness or resistance to a pulling force.
 - D ability to resist heat.
- (2)
- 1.1.6 A plasma cutter uses ... as pressurised gas to do the cutting.
- A acetylene
 - B argon
 - C LPG gas
 - D compressed air
- (2)

- 1.1.7 The thermosiphon, open-loop and closed-loop cooling systems are all synonymous with ...
A hydraulic systems.
B vehicle cooling.
C irrigation.
D oil pumps. (2)
- 1.1.8 Improper use of the oxyacetylene gas torch can cause the flame to extinguish with a loud snap or pop. To prevent the flashback from entering the regulator or the gas bottle, you must ...
A quickly close the acetylene bottle.
B quickly close the oxygen bottle.
C make use of a flashback arrester.
D call the teacher. (2)
- 1.1.9 Piggery waste is comparable to other animal waste, except that piggery waste contains elevated levels of ... that can be toxic to the natural environment.
A copper
B lead
C aluminium
D carbon (2)
- 1.1.10 Which ONE of the following energy sources does not need water to generate energy?
A Hydroelectricity
B Geothermal energy
C Wind energy
D Biomass energy (2)
- 1.2 Complete the following sentences by filling in the missing word(s). Write only the word(s) next to the question number (1.2.1–1.2.5) in the ANSWER BOOK, for example 1.2.6 B.
- 1.2.1 A tool that is driven by oil is called a (an) ... tool. (2)
- 1.2.2 The primary purpose of a ... is to help a farmer determine an exact location on a piece of land. (2)
- 1.2.3 ... in sunlight hit the solar panel and are absorbed by semiconducting materials. (2)
- 1.2.4 A ... hydraulic cylinder is used to lift or lower an implement hooked to the three-point mechanism of a tractor. (2)
- 1.2.5 The Welger baler uses ... to roll the grass into bales. (2)

- 1.3 Choose an item from COLUMN B that matches an item/picture in COLUMN A
Write only the letter (A–G) next to the question number (1.3.1–1.3.5) in the
ANSWER BOOK, for example 1.3.6 H.

COLUMN A	COLUMN B
1.3.1 Class A – wood and paper fire	A storing of poisonous substances
1.3.2 	B water extinguishers C V-belt cover D brown E electric fence
1.3.3 	F blue G dry powder
1.3.4 Class C – Electrical fires	
1.3.5 Colour of live wire on portable electric drill	

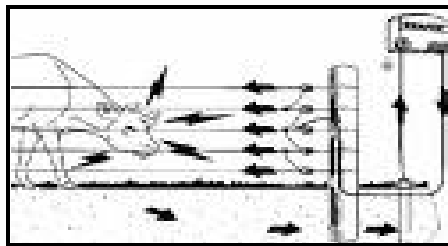
(5 x 2)

[10]

TOTAL SECTION A:**40**

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

- 2.1 Steel is classified according to its carbon content.
- 2.1.1 Name THREE main groups into which steel is classified. (3)
- 2.1.2 Name FOUR effects that alloy elements that are added to steel can have on the properties of steel. (4)
- 2.2 A fibreglass canopy for a tractor has cracked and needs to be repaired.
- 2.2.1 Name FOUR elements needed to form fibreglass products. (4)
- 2.2.2 Explain the process of repairing this fibreglass canopy. (6)
- 2.3 A part of an electric fence is shown below.



- 2.3.1 Name THREE possible causes of a voltage leak on an electrical fence. (3)
- 2.3.2 Describe TWO ways of increasing the earth efficiency of an electric fence in poor earth conditions like sandy or gravel soils. (2)
- 2.3.3 Name THREE reasons for poor earth connections. (3)
- 2.4 Name FOUR properties of teflon as a synthetic material. (4)
- 2.5 Name THREE applications of epoxy-based materials. (3)
- 2.6 Name THREE uses of Vesconite on a farm. (3)
- [35]**

QUESTION 3: ENERGY

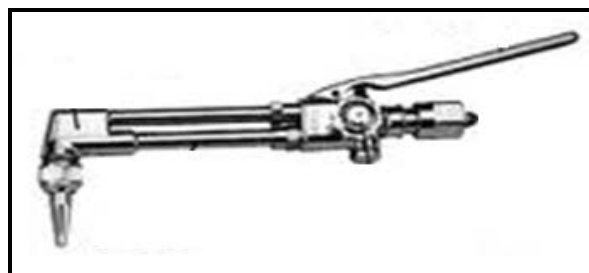
- 3.1 You stay in a remote rural area where no electricity is available and you still use oil lamps and candles. There are no streams or rivers in the vicinity. It is also not cost-effective to get electricity from the national electricity provider.
- 3.1.1 What kind of cost-effective energy system would you consider to provide electricity by harnessing the energy from the sun? (1)
- 3.1.2 Motivate your answer to QUESTION 3.1.1 by stating THREE advantages of this energy source. (3)
- 3.1.3 Briefly explain the process of transforming sunlight into electrical energy using solar panels. (5)
- 3.2 Hydro-energy is often neglected as an alternative source of energy.
Name TWO instances where hydro-energy can be utilised instead of other alternative energy sources found on a farm. (2)
- 3.3 What should you take into consideration about the location of a site when planning to erect a wind turbine for electricity production? (2)
- 3.4 Discuss the positive impact that the use of biogas, instead of the use of electricity obtained from fossil fuels like coal, has on the country. (5)
- 3.5 State TWO advantages of biodiesel over the use of fossil fuel in agriculture. (2)
- [20]**

QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES

- 4.1 The picture below shows a lawnmower that contains cast iron and mild steel components.

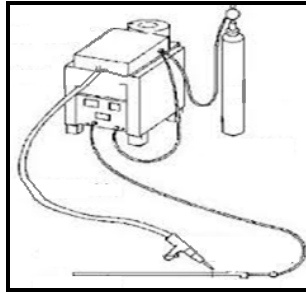


- 4.1.1 Name the types of welding rods that can be used generally to weld cast iron components. (2)
- 4.1.2 You have to weld two pieces of pipe by means of arc welding. What welding positions can be used when welding pipe? (3)
- 4.1.3 Name THREE advanced welding techniques that can be used on the farm to make repairs. (3)
- 4.2 Metal reacts to high temperatures by expanding.
What can you do to prevent metal from distorting when subjected to heat? (2)
- 4.3 Describe the procedure to follow when cutting a piece of metal with the aid of an oxyacetylene cutting torch as shown in the illustration below.



(5)

4.4 Below is a drawing of a MIG welding machine.



4.4.1 Lack of penetration is a welding defect that commonly occurs when welding with a MIG welding machine.

Give FOUR reasons why this welding defect occurs.

(4)

4.4.2 Name FOUR hazards of MIG welding.

(4)

4.4.3 State FOUR advantages of MIG welding.

(4)

4.5 You want to build a small cottage on a farm.

Plan and draw a freehand top-view sketch of the cottage. (Do NOT spend more than 10 minutes on this question.)

The following must appear in your drawing:

- Bedroom
- Kitchen
- Toilet, shower and washbasin
- Living room
- Windows, doors, bed, cupboards and stove

Marks will be given for:

Neatness of the drawing	1
Are the rooms asked indicated?	1
Are the windows and doors indicated?	2
Are the beds, cupboards, shower and stove indicated?	2
Are the washbasin and toilet indicated?	2

(8)
[35]

QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT

5.1 A tractor is one of the most important pieces of equipment on the farm, yet it is also among the most dangerous.

Name any FOUR safety requirements when using or servicing a tractor. (4)

5.2 Various advanced data capturing systems are used throughout the year in different applications on the farm.

5.2.1 How can a farmer benefit from making use of the global positioning system (GPS)? (3)

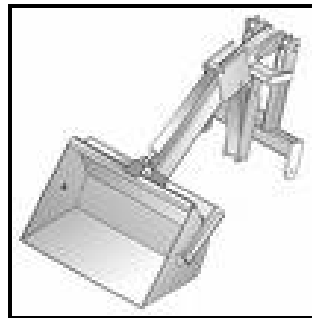
5.2.2 Briefly describe the working of the geographical information system (GIS) used on a farm. (4)

5.3 Name THREE safety tips that should be taken into consideration when operating a rotary mower. (3)

5.4 Name TWO types of hay rakes used to rake hay into windrows. (2)

5.5 Which factors will you take into consideration when selecting a baler? (3)

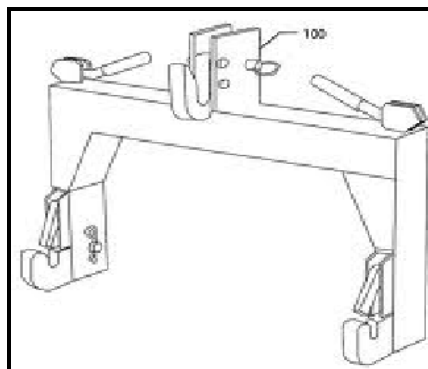
5.6 The sketch below shows a front loader that utilises hydraulics as the operating system for the front bucket.



5.6.1 Name the main parts of a hydraulic system. (3)

5.6.2 Which requirements should hydraulic oil meet in order to meet SABS standards? (3)

5.6.3 Why will a farmer make use of a quick hitch on his tractor to hitch implements? (2)



- 5.7 The purpose of positive mass displacement on a tractor is to achieve optimal and safe operation.
Name the effects that positive mass displacement will have on the tractor's performance. (3)
- 5.8 Tractors do not all have sensitivity elements.
What is used to prevent an implement from bending and breaking when the implement hooks something under the soil surface? (2)
- 5.9 From an economical point of view it is important to buy a tractor that will suit the requirements for a specific task.
Name any THREE requirements that will influence your choice of a new tractor. (3)
- 5.10 Name THREE tasks that can be performed with the aid of an air compressor. (3)
- 5.11 Name TWO possible causes of the clutch on a tractor not releasing properly. (2)
- [40]**

QUESTION 6: WATER MANAGEMENT

- 6.1 Name FOUR water purification systems. (4)
- 6.2 When installing a centre pivot, how should the pivot be calibrated so that the area around the centre of the pivot is not soaked with water while the outside is under-watered? (2)
- 6.3 Name any FOUR problems that can be associated with irrigation. (4)
- 6.4 Outline the factors that should be taken into consideration when developing a water scheduling program? (4)
- 6.5 What will influence your choice for an effective watering system when purchasing a centre-pivot system? (3)
- 6.6 State THREE advantages of a centre-pivot irrigation system. (3)
- 6.7 A septic tank, as well as a French drain, can be used for managing waste water on a farm.
Briefly explain why you will use a septic tank instead of a French drain. (2)
- 6.8 A farmer in a rural area wants to irrigate his small crop of cabbage where no electricity is available.
What irrigation methods can he use to water the whole area effectively? (2)
- 6.9 What is the main objective of slope drainage in waterlogged areas? (4)
- 6.10 Name TWO sources of water for irrigation purposes. (2)
- [30]**

TOTAL SECTION B: 160
GRAND TOTAL: 200