



# education

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Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**AGRICULTURAL TECHNOLOGY**

**FEBRUARY/MARCH 2010**

**MARKS: 200**

**TIME: 3 hours**

**This question paper consists of 15 pages and an answer sheet.**

**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.

**2. SECTION A: MULTIPLE-CHOICE QUESTIONS**

- 2.1 Answer the questions in this section on the attached ANSWER SHEET.
- 2.2 Write your centre number and examination number on the attached ANSWER SHEET.
- 2.3 Follow the instructions when answering the multiple-choice questions.
- 2.4 Place the COMPLETED ANSWER SHEET in the front of the ANSWER BOOK.

**3. SECTION B: STRUCTURED QUESTIONS**

- 3.1 This section consists of FIVE questions.
- 3.2 Answer the questions in this section in the ANSWER BOOK.
- 3.3 Number the answers correctly according to the numbering system used in this question paper.
- 3.4 Start EACH question on a NEW page.
- 3.5 It is in your own interest to pay attention to the accuracy and neatness of your work.

**SECTION A****QUESTION 1**

Various options are provided as possible answers to the following questions. Choose the answer and make a cross (X) in the block (A – C) next to the question number (1.1 – 1.20) on the attached ANSWER SHEET.

EXAMPLE:

1.0	<input checked="" type="checkbox"/> A	B	C
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- 1.1 The reason why black smoke can be seen at the exhaust of a diesel tractor is because ...
- A the piston rings are worn.  
B the diesel mixture is too rich.  
C water is leaking into the combustion chamber. (2)
- 1.2 Hydraulic tools are driven by ... pressure.
- A oil  
B air  
C water (2)
- 1.3 Stainless steel consists of a combination of metals. Indicate the correct group:
- A Steel, chrome and nickel  
B Tin, manganese and silver  
C Aluminium and zinc (2)
- 1.4 Which ONE of the following types of plastic is the least heat resistant?
- A Teflon  
B Perspex  
C Bakelite (2)
- 1.5 The most important drawing used for the building of structures on the farm is the ..., because it shows all the required detail.
- A locality plans  
B setting-out drawings  
C site plans (2)
- 1.6 The welding station is surrounded by plastic screens. These plastic screens must be light ...
- A translucent.  
B absorbent.  
C reflectant. (2)

- 1.7 A solar panel produces direct current with low volts. The device used to change the direct current to alternating current if an alternating-current motor is used, is called a ...  
A transformer.  
B alternator.  
C distributor. (2)
- 1.8 When welding cast iron, a specific electrode must be used. What type of metal will be used to manufacture the inner core of such an electrode?  
A Copper  
B Mild steel  
C Nickel (2)
- 1.9 A factor that can cause welding joints to distort, is ...  
A using a direct-current welder.  
B the wrong electrode coating.  
C the wrong welding procedure. (2)
- 1.10 Choose a reason why adhesion problems appear during the welding process:  
A Wrong angle of the electrode in relation to the work piece  
B Dirty metal  
C Wrong welding technique (2)
- 1.11 Energy that is obtained from plants like sunflowers is called ... energy.  
A nuclear  
B geothermal  
C bio- (2)
- 1.12 The bale density of rectangular bales can be changed by ...  
A increasing or decreasing the tempo of baling.  
B increasing or decreasing the resistance to the hay moving through the baling chamber.  
C increasing the amount of hay that is fed into the baler. (2)
- 1.13 The main reason for metal fatigue in a hammer mill is ...  
A vibration.  
B coarseness of the sieves.  
C a clogged cyclone. (2)

- 1.14 The main aspect that must be kept in mind when a hammer mill is coupled to the power take-off shaft (PTO) of a tractor is ...
- A that all safety screens must be in place and in working order.
  - B that the driving shaft must be as straight as possible.
  - C All the above-mentioned
- (2)
- 1.15 Communication systems such as ... are used to activate a centre-pivot irrigation system.
- A computers
  - B two-way radios
  - C the Internet
- (2)
- 1.16 A system that was developed by the government of the United States of America to determine your exact location globally, is called a/an ... system.
- A Internet
  - B GPS
  - C GIS
- (2)
- 1.17 The ... pump can effectively be used to extract water from deep boreholes where no rods or electricity are available.
- A rotary
  - B jet
  - C submersible
- (2)
- 1.18 The ... welding machine is the best machine to use when welding thin sheet metal at a low temperature.
- A arc
  - B direct-current
  - C MIG
- (2)
- 1.19 A drainage pipe with a diameter of ... mm is usually connected to the outlet of a toilet.
- A 75
  - B 100
  - C 200
- (2)
- 1.20 Standardisation of farm implements is done in order to ...
- A save money.
  - B keep fewer replacement parts in stock.
  - C All the above-mentioned
- (2)

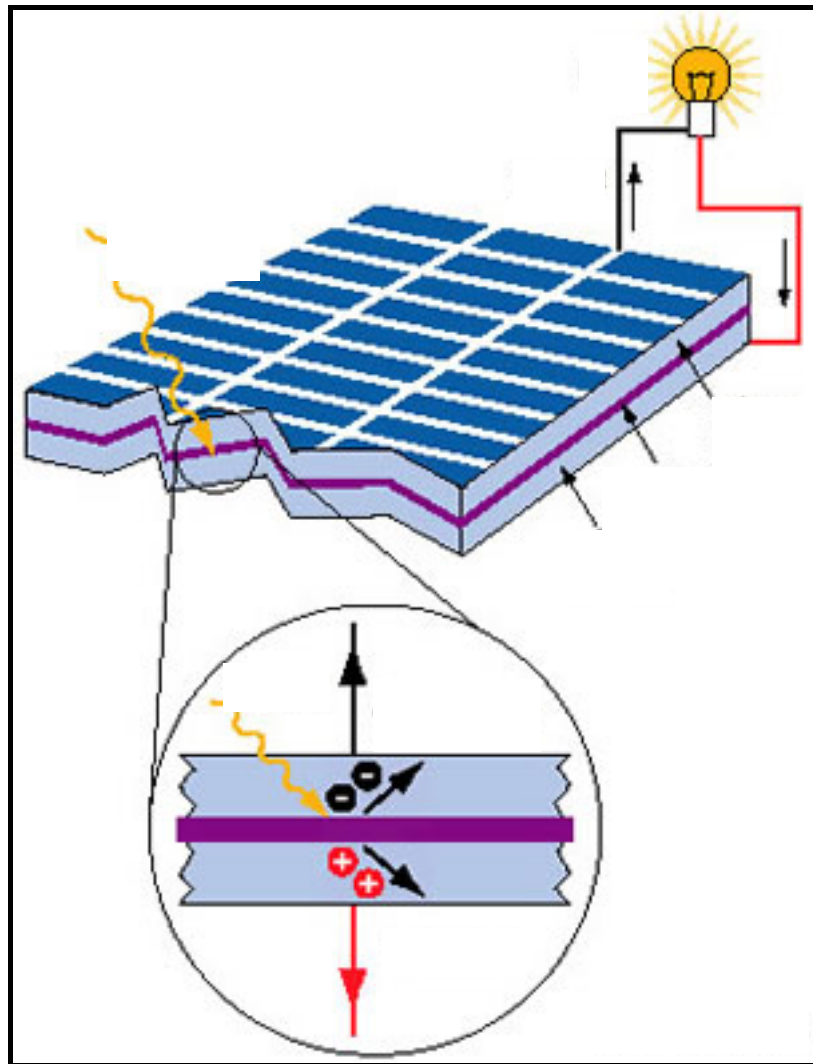
**TOTAL SECTION A: 40**

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

- 2.1 Different metals with different qualities and characteristics can be used on the farm for various purposes.
- 2.1.1 Compare stainless steel and mild steel in table form in terms of the following characteristics:
- (a) Weldability
  - (b) Malleability
  - (c) Corrosion resistance
  - (d) Durability
  - (e) Affordability (10)
- 2.1.2 The properties of stainless steel can be altered by adding chromium, manganese and nickel. Name FIVE advantages of adding an alloy element like chromium to stainless steel. (5)
- 2.2 Adhesives can be successfully used under various conditions if the correct adhesive is chosen.
- Discuss the properties of adhesives under the following headings:
- 2.2.1 Heat resistance (temperature) (3)
- 2.2.2 Water resistance (2)
- 2.3 List the requirements that should be met when erecting an electrical fence or any other fence on a farm. (7)
- 2.4 Insulation material used in the roofs of buildings must adhere to certain safety measures. List FOUR of these measures. (4)
- 2.5 Name any FOUR factors that should be kept in mind when installing water troughs for animals. (4)
- [35]**

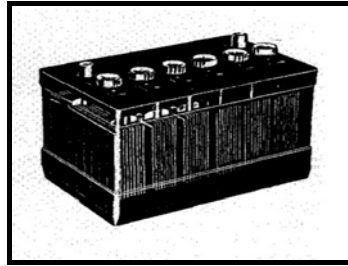
**QUESTION 3: ENERGY**

- 3.1 Sun energy is the most important source of energy, but is also a source that is mostly untapped. If we can manage to use energy from the sun more productively, the world's energy crises would be solved.



- 3.1.1 Name the TWO types of energy that are directly generated from solar energy, and name a device in each case that can convert that type of energy effectively. (4)
- 3.1.2 Name FOUR advantages of using alternative energy sources. (4)

- 3.2 Cars, tractors and trucks use batteries, as shown in the sketch below, for various purposes.

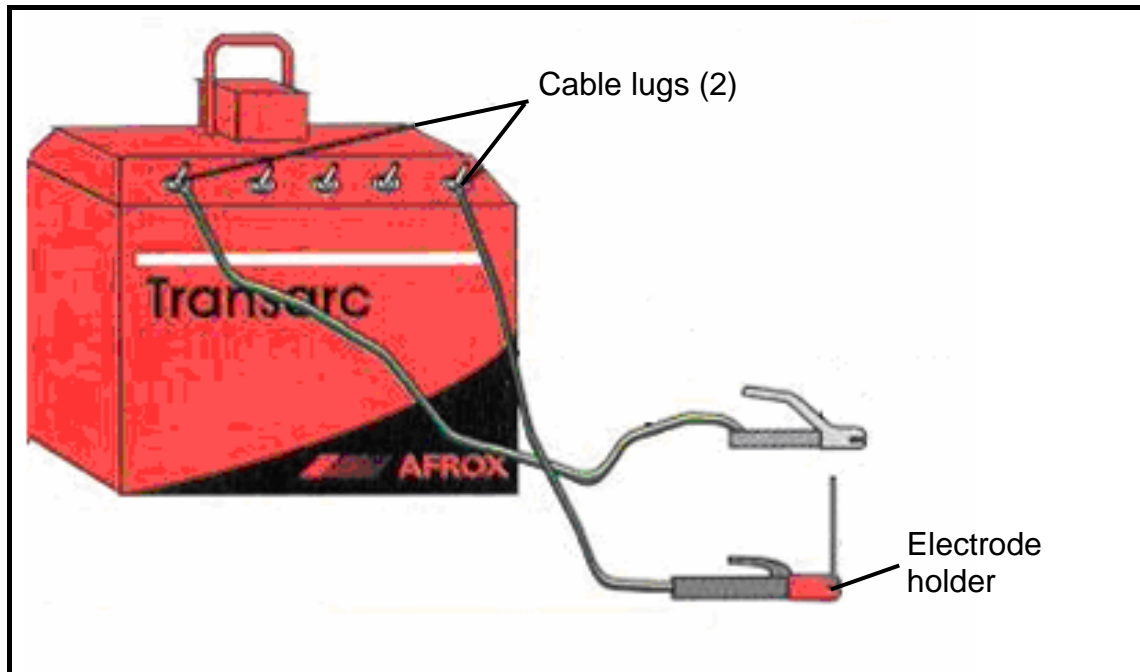


- 3.2.1 Name the type of acid used inside the battery and name the liquid that is used to dilute the acid. (2)
- 3.2.2 What type of metal is used to manufacture the plates inside the battery? (1)
- 3.2.3 Identify the type of energy that is transformed to electric energy in a battery. (1)
- 3.2.4 What type of current is found in a battery? (1)
- 3.2.5 Name any THREE properties of batteries. (3)
- 3.2.6 Name FOUR aspects that should receive special attention when servicing the battery. (4)
- [20]**



**QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES**

- 4.1 The figure below shows a machine that is used in the farm workshop. Study it carefully and answer the questions that follow.

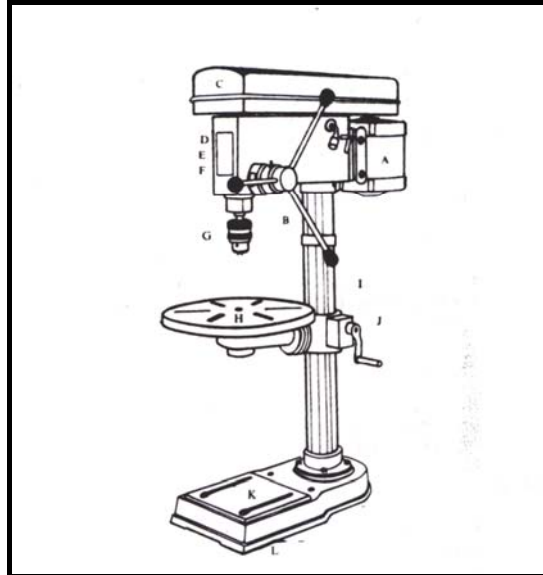


- 4.1.1 Give the name of this type of welding machine. (1)
- 4.1.2 Briefly describe the function and purpose of both the cable lugs and the couplings indicated in the sketch. (2)
- 4.1.3 Which substance is used inside this type of welder to cool it down? (1)
- 4.1.4 Briefly describe the principle of arc welding. (4)
- 4.1.5 Name FIVE hazards of arc welding. (5)
- 4.1.6 Identify the material used to insulate the electrode holder and name TWO crucial properties of this insulation material. (3)
- 4.2 Equipment is designed to lighten the work load of the people using it. Older machines are normally heavy and very bulky. The inverter welder is a new invention that makes the welding process much easier for welders.
- 4.2.1 Name FOUR advantages of the inverter welder. (4)
- 4.2.2 Briefly explain the welding term *tacking*. (3)

- 4.3 Name TWO advanced welding techniques that are occasionally used on the farm. (2)
- 4.4 Oxy-acetylene welding plays an important role in the maintenance, reparation and building of implements on a farm.
- 4.4.1 Name TWO types of metal that can be cut by using an oxy-acetylene set. (2)
- 4.4.2 Briefly describe the oxy-acetylene cutting process. (5)
- 4.5 Name THREE procedures that must be followed before enamels and varnishes are applied to metal objects. (3)
- [35]**

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

- 5.1 The sketch below shows a machine that can be used to drill holes and is found in a workshop.



- 5.1.1 The above tool uses electricity. Name any TWO safety precautions that should be taken before working with electrical equipment. (2)
- 5.1.2 The machine in the sketch uses V-belts in its drive mechanism. Name FOUR advantages of V-belts. (4)
- 5.2 The photo below shows a machine that can be used on a farm to cut silage.



- 5.2.1 Explain THREE safety precautions that should be taken when working with this machine. (3)
- 5.2.2 Describe the procedure to follow when this machine is prepared for use. (5)

5.3 The picture below shows a tractor and a planter in the field.



5.3.1 Describe the procedures that have to be followed at the end of the season when the planter is stored for a long time. (4)

5.3.2 Name TWO reasons for equipping a tractor with a clutch. (2)

5.4 Earth moving machines and tractors are all equipped with hydraulic cylinders that enable the machine to perform various tasks.

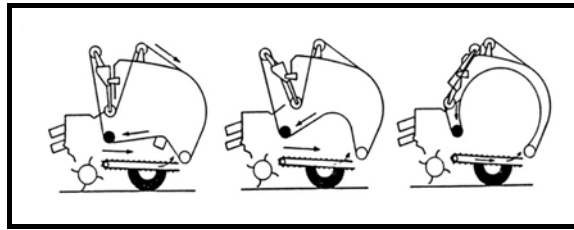


5.4.1 What activates the hydraulic cylinders of bulldozers? (1)

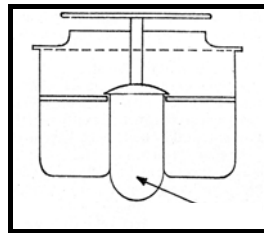
5.4.2 Name FOUR advantages of the use of transmission oil in the hydraulic system of a tractor. (4)

5.4.3 Name the function of the final drive as used in the differential of a bulldozer. (2)

- 5.5 The round baler, as shown in the illustration below, is used on a farm to make large, round bales.



- 5.5.1 Explain the working of the round baler that uses the Vermeer system for binding the bales. (4)
- 5.5.2 How is the density of the bales of a round baler determined? (1)
- 5.5.3 Name ONE disadvantage of round bales with regard to the size of the bales. (1)
- 5.6 Study the illustration below and answer the questions that follow.



- 5.6.1 Name the thermostat in the sketch above. (1)
- 5.6.2 What is the function of the thermostat? (2)
- 5.7 The photo below shows a power take-off connection shaft that is used as a drive link between the tractor and the implement.

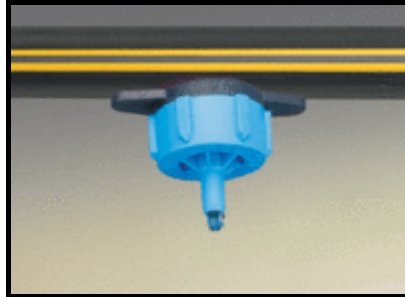


- 5.7.1 Name the device that facilitates the PTO shaft to operate at an angle. (1)
- 5.7.2 Name the function of the grease nipples installed on this device. (1)
- 5.7.3 The PTO shaft must always be screened off to prevent injuries. Name TWO requirements for these screens. (2)

**[40]**

**QUESTION 6: WATER MANAGEMENT**

- 6.1 The picture below shows a device that is used for specific irrigation purposes. Study the picture carefully and answer the questions that follow.



- 6.1.1 Identify the device shown above. (1)
- 6.1.2 Give a reason why a sand filter is used in this irrigation system. (1)
- 6.1.3 Give a reason why it is necessary to have an air valve incorporated into the main water line of this irrigation system. (1)
- 6.1.4 Name the material used to manufacture the pipe shown above. (1)
- 6.2 Different types of pumps are used on a farm to extract water for irrigation and household purposes.
- 6.2.1 Name TWO types of pumps that can be used to extract water from shallow rivers. (2)
- 6.2.2 Name FIVE aspects a farmer should take into consideration before a decision is made about the type of irrigation pump that can be used. (5)
- 6.2.3 State TWO alternative uses for the pumps identified in QUESTION 6.2.1. (2)
- 6.3 Drainage systems must be designed in such a way that excess water is effectively removed from waterlogged fields.
- 6.3.1 Briefly explain the components of the three layers of a stone drain. (3)
- 6.3.2 Name THREE disadvantages of the closed drainage system. (3)
- 6.3.3 Irrigation pipes are often buried underneath the soil. Name THREE precautionary measures that should be taken when these pipes are laid. (3)

- 6.4 The photo below shows a centre-pivot irrigation system. Answer the questions that follow.



- 6.4.1 Name THREE advantages of this type of irrigation system. (3)
- 6.4.2 Briefly describe the measures that must be taken to prevent the system from falling down when one of the wheels get stuck or the electrical motor that drives the wheel breaks down. (3)
- 6.4.3 The sprayers in this system can easily be blocked by dirt/rust in the pipes. Briefly describe how this dirt in the pipes can be removed effectively without dismantling the whole system. (2)
- [30]**

**TOTAL SECTION B: 160**

**GRAND TOTAL: 200**

**ANSWER SHEET****CENTRE NUMBER:**

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**EXAMINATION NUMBER:**

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**SECTION A****QUESTION 1**

1.1	A	B	C
1.2	A	B	C
1.3	A	B	C
1.4	A	B	C
1.5	A	B	C
1.6	A	B	C
1.7	A	B	C
1.8	A	B	C
1.9	A	B	C
1.10	A	B	C
1.11	A	B	C
1.12	A	B	C
1.13	A	B	C
1.14	A	B	C
1.15	A	B	C
1.16	A	B	C
1.17	A	B	C
1.18	A	B	C
1.19	A	B	C
1.20	A	B	C

**TOTAL SECTION A: (20 x 2)****40****TOTAL:**

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