



# education

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Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**AGRICULTURAL TECHNOLOGY**

**NOVEMBER 2008**

**MARKS: 200**

**TIME: 3 hours**

**This question paper consists of 17 pages and a 1-page 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 Follow the instructions when answering the multiple-choice questions.
- 2.3 Place the COMPLETED ANSWER SHEET inside 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 provided.
- 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 possible options are provided as 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 – 1.15) on the attached ANSWER SHEET.

Example:

|     |                                       |   |   |
|-----|---------------------------------------|---|---|
| 1.0 | <input checked="" type="checkbox"/> A | B | C |
|-----|---------------------------------------|---|---|

- 1.1 ... cylinders may never be stored in a horizontal position because the gas may leak and cause an explosion.
- A Carbon dioxide  
B Oxygen  
C Acetylene (3)
- 1.2 Pneumatic tools are driven by ...
- A water.  
B air.  
C oil. (3)
- 1.3 Which ONE of the following materials is most suitable to be used as insulation for water pipes?
- A Cotton  
B Nylon  
C Copper (3)
- 1.4 The best type of insulating material that can be used to isolate the wires of an electrical fence from the upright posts is ...
- A copper.  
B aluminium.  
C porcelain. (3)
- 1.5 The reason for treating wooden poles, used as corner and gate posts, with creosote is to ...
- A insulate it.  
B give it a more acceptable look and smell.  
C prevent insects from attacking the wood. (3)
- 1.6 The welding plane changes continuously when the welder welds a run during this type of welding:
- A Pipe welding  
B Overhand welding  
C Vertical welding (3)

- 1.7 ... makes welding difficult and it is recommended that it is removed prior to welding.
- A A welding helmet
  - B Galvanising
  - C An earth-leakage circuit-breaker (3)
- 1.8 A process whereby parts, that are subjected to serious scraping, can be built up by padding it with a wear-resistant metal, is called ...
- A spot welding.
  - B brazing.
  - C hard-facing. (3)
- 1.9 The three types of gasses used in MIG welding are ...
- A carbon monoxide, oxygen and acetylene.
  - B acetylene, propane and oxygen.
  - C argon, helium and carbon dioxide. (3)
- 1.10 The energy source utilised for producing bio-energy is found in ...
- A air.
  - B water.
  - C plants. (3)
- 1.11 A ... needs to be installed when a three-phase electrical motor is used to drive a centrifugal pump on a farm.
- A capacitor
  - B double-conductor cable
  - C starter (3)
- 1.12 A shear bolt of a plough serves as a ...
- A locking device.
  - B safety mechanism.
  - C ratchet coupling. (3)
- 1.13 The Welger and Vermeer systems are associated with ...
- A round balers.
  - B combine harvesters.
  - C the three-point system of a tractor. (3)

- 1.14 Which ONE of the following pumps can best be used to draw water from a very deep borehole where no electricity is available?
- A Centrifugal pump
  - B Rotary pump
  - C Submersible pump
- (3)
- 1.15 Which ONE of the following devices, according to legislation, must always be installed in the pipeline if water is pumped from rivers, streams or dams?
- A Foot valve
  - B Water meter
  - C Sieve
- (3)

**TOTAL SECTION A (15 x 3): 45**

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

2.1 Tinned mild-steel sheets are commonly used on a farm for various purposes.

2.1.1 Give a reason for the tinning of mild-steel sheets. (1)

2.1.2 Describe the process of tinning mild steel sheets. (3)

2.1.3 Name TWO uses of tinned sheets on the farm. (2)

2.1.4 Name the chemical process that occurs when the surface of mild steel sheets turns red when exposed to the elements. Briefly explain this chemical process. (5)

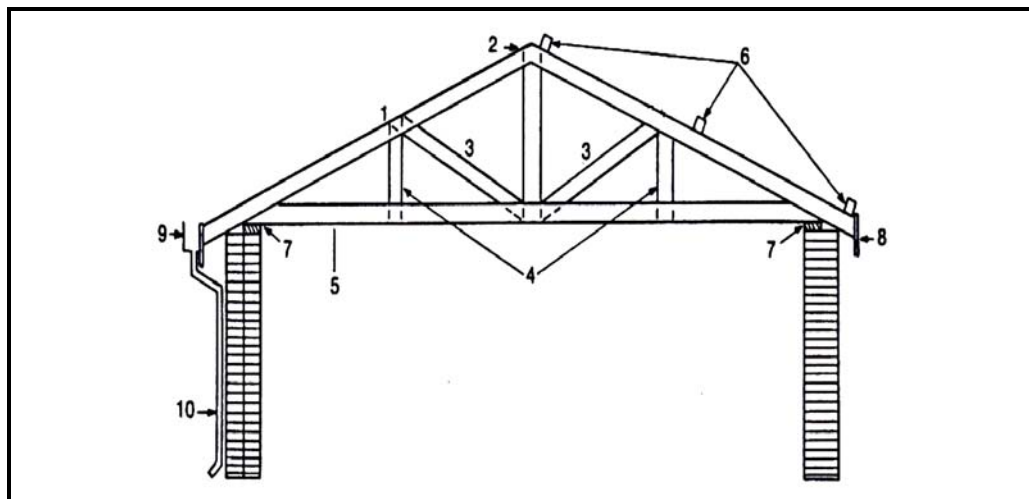
2.1.5 Name TWO other methods, apart from tinning, that can be used to protect metals against the elements of nature. (2)

2.2 The most important rule applicable to the mixing of concrete is that it cannot be remixed after ONE hour.

2.2.1 Explain this rule or phenomena. (3)

2.2.2 Name THREE requirements for the foundation when building a structure on sandy soil. (3)

2.3 The farmer constructs roof trusses made of SA pine for a new shed that must be built on the farm.



2.3.1 What is the most important function of a roof truss? (1)

2.3.2 Name the parts of the roof truss that are labelled 2, 3 and 5 on the sketch. (3)

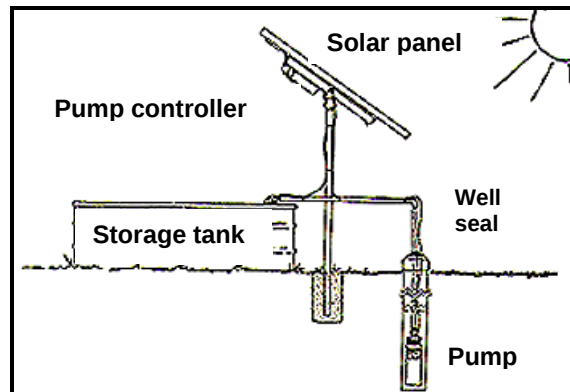
2.3.3 Explain the use of triangular shapes in the design and construction of roof trusses. (2)

2.4 Design and sketch a freehand plan of a pigsty that you want to erect on your farm.  
The drawing must include the following:

- 2.4.1 A top view of the pigsty (2)
  - 2.4.2 Show the compartments with measurements (1)
  - 2.4.3 Show the method of draining excess water (1)
  - 2.4.4 Show the position of the water and feeding troughs (1)
  - 2.4.5 Indicate the scale of the drawing (2)
  - 2.4.6 Marks for correctness and neatness (3)
- [35]**

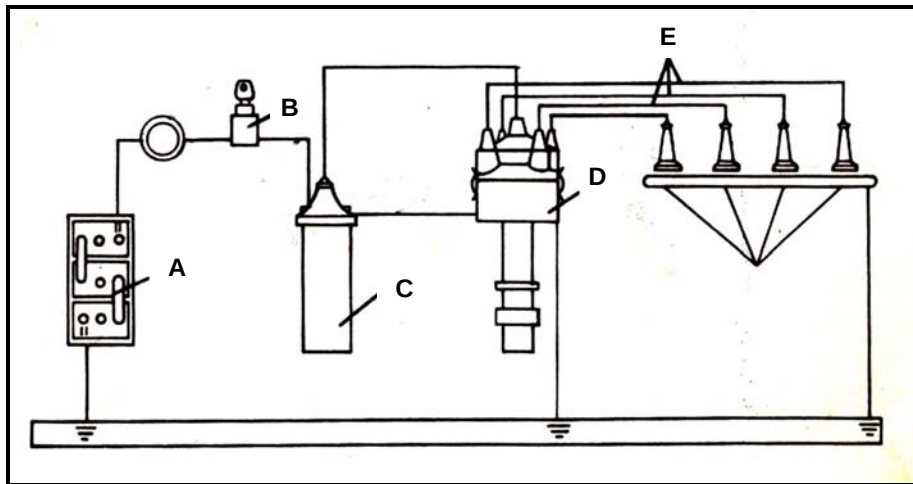
**QUESTION 3: ENERGY**

- 3.1 The diagram below shows an energy source that is used to generate electric energy for a submersible pump.



- 3.1.1 What energy source is utilised in this illustration? (1)
- 3.1.2 This panel produces direct current at low volts. What device must be used to change the current to alternating current if an alternating current motor is used? (1)
- 3.1.3 Can the energy from this source be used during night-time? Explain your answer. (3)
- 3.1.4 State TWO advantages of this type of energy source. (2)
- 3.1.5 State THREE disadvantages of this type of energy source. (3)
- 3.1.6 Give TWO safety precautions that must be followed when installing electrical equipment. (2)

3.2 The illustration below shows a system found in a motor vehicle. Study it carefully and answer the questions that follow.



3.2.1 Name the device that produces the energy needed for the starter of a motor vehicle when you want to switch the engine on. (1)

3.2.2 Identify the parts of the electrical ignition system labelled A to E in the illustration. (5)

3.2.3 Which component of the ignition system increases the voltage (V) in the secondary circuit to 30 000 volt? (1)

3.2.4 Is a motor vehicle earthed negatively or positively? (1)  
**[20]**

**QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES**

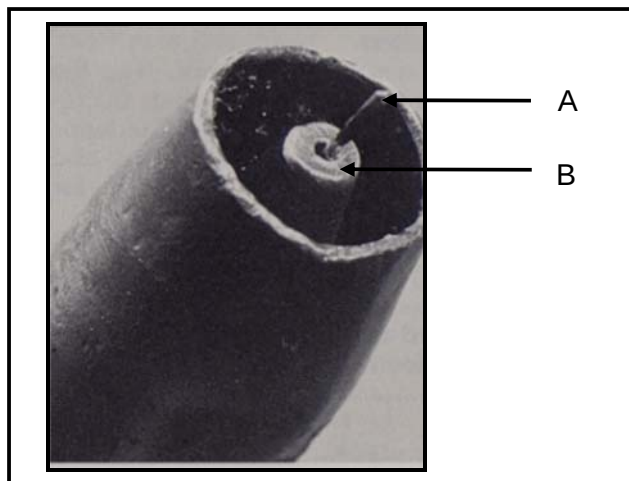
4.1 Read the following paragraph carefully and answer the questions that follow.

While ploughing a piece of land you notice that oil is leaking through the cast-iron sump of the tractor. When you remove the oil sump you find that it is cracked.

4.1.1 Describe the complete welding procedure that you would follow to repair the crack in the sump with the aid of an arc-welding machine. (10)

4.1.2 Why should a welded cast-iron part never be submerged in water, while it is still warm? Motivate your answer. (2)

4.2 The photo below shows the welding nozzle of a MIG welding machine.



4.2.1 Give the name and function of the part labelled A. (2)

4.2.2 What provides the shield that prevents the welding bead from coming into contact with oxygen during the welding process? (1)

4.2.3 Part A sometimes gets stuck to the part labelled B.

State the cause of this and indicate how this can be prevented. (2)

4.2.4 Name the part labelled B. (1)

4.2.5 State TWO safety rules that must be followed when welding with the MIG welding machine. (2)

4.2.6 What is the energy source for this MIG welding machine? (1)

4.3 Explain the process of overhead welding when using oxy-acetylene welding equipment. (3)

4.4 Welding processes produce enormous heat for the filler rod and base metal to be fused. This heat causes the welded part to distort.

4.4.1 Make a neat freehand sketch and label it clearly to show the following types of distortion on a piece of metal that was welded:

- (a) Longitudinal shrinking
- (b) Angular shrinking longitudinally
- (c) Angular shrinking
- (d) Lateral shrinking (4)

4.4.2 Suggest TWO ways of controlling this distortion. (2)

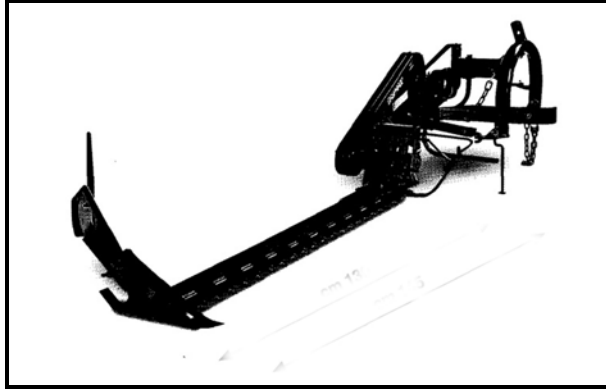
4.4.3 The heat that causes the distortion of the welding project also hardens the metal because of the tempering effect that has taken place.

Describe the annealing process that you will follow to soften the metal again for further working processes. (2)

4.5 List the steps that need to be followed when finishing off a piece of metal by polishing it. (3)  
**[35]**

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

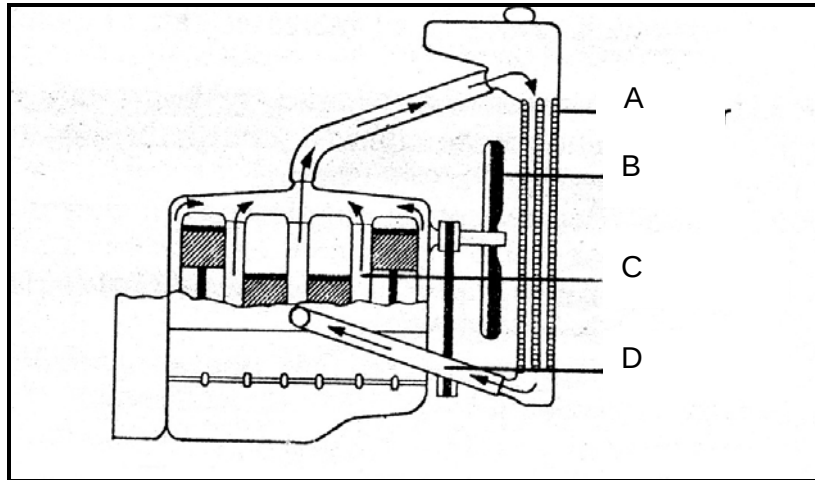
- 5.1 The illustration below shows a cutting machine used on the farm for cutting crops for various purposes.



- 5.1.1 Briefly describe how this machine is connected to the tractor. (3)
- 5.1.2 Name the component that provides the drive needed for this machine to operate effectively. (1)
- 5.1.3 Which device on the tractor would you use to set the cross angle of the cutting machine? (1)
- 5.1.4 The drive mechanism between the tractor and the cutting machine must be screened off.

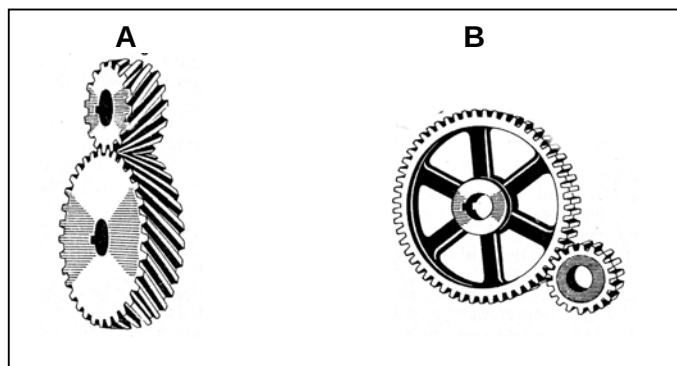
State THREE requirements that effective safety screens, used on farm machinery, should comply with. (3)

- 5.2 The diagram below represents an engine that can be used on a farm for various purposes.



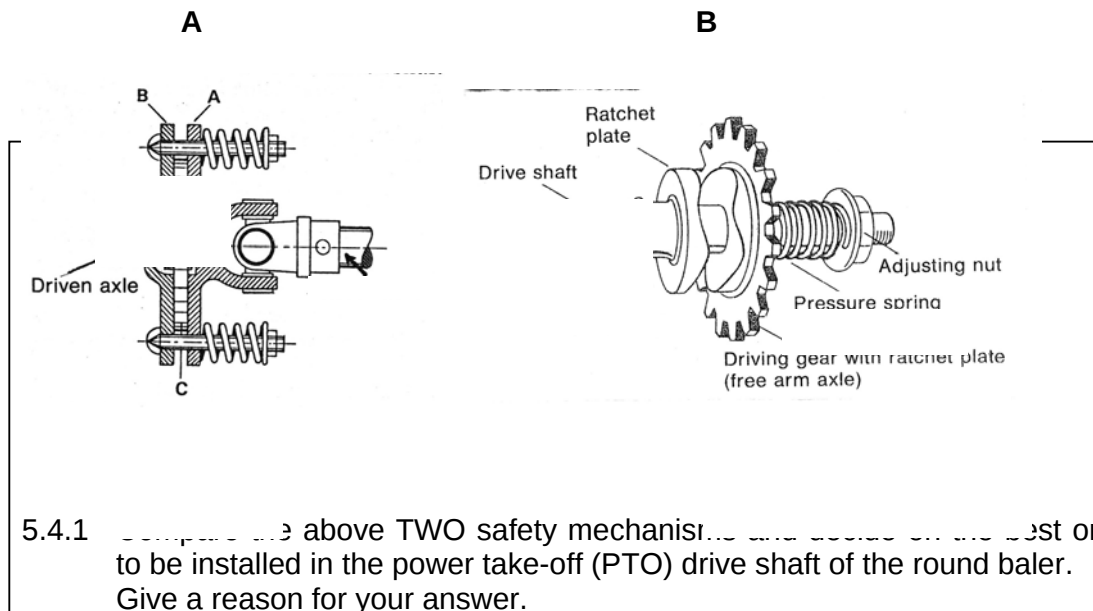
- 5.2.1 Which type of cooling system is shown in this diagram? (1)
- 5.2.2 Identify the parts labelled A to D in the diagram. (4)
- 5.2.3 Briefly describe the working of this type of cooling system. (3)
- 5.2.4 While examining the radiator cap you find that it leaks.  
Give TWO reasons why a radiator cap will start leaking. (2)

- 5.3 The illustration below shows two types of gears that can be used in a tractor's gearbox.



- 5.3.1 Identify the gears labelled A and B. (2)
- 5.3.2 Compare, in table form, the TWO gears illustrated in the diagram above, under the following headings: (2)
- |                   |     |
|-------------------|-----|
| (a) Application   | (2) |
| (b) Advantages    | (2) |
| (c) Disadvantages | (2) |
- 5.3.3 What type of metal is usually used to manufacture gears? (1)
- 5.3.4 Is the oil used in the gearboxes of tractors low or high viscosity oil? (1)

- 5.4 Balers, harvesters and other farm machines are fitted with safety equipment, as shown below, to safeguard the machine against serious damage when something goes wrong.



- 5.4.2 Explain how you will service the clutch shown in diagram A after the baling season has finished. (2)

- 5.4.3 Describe the function of a grease nipple. (1)

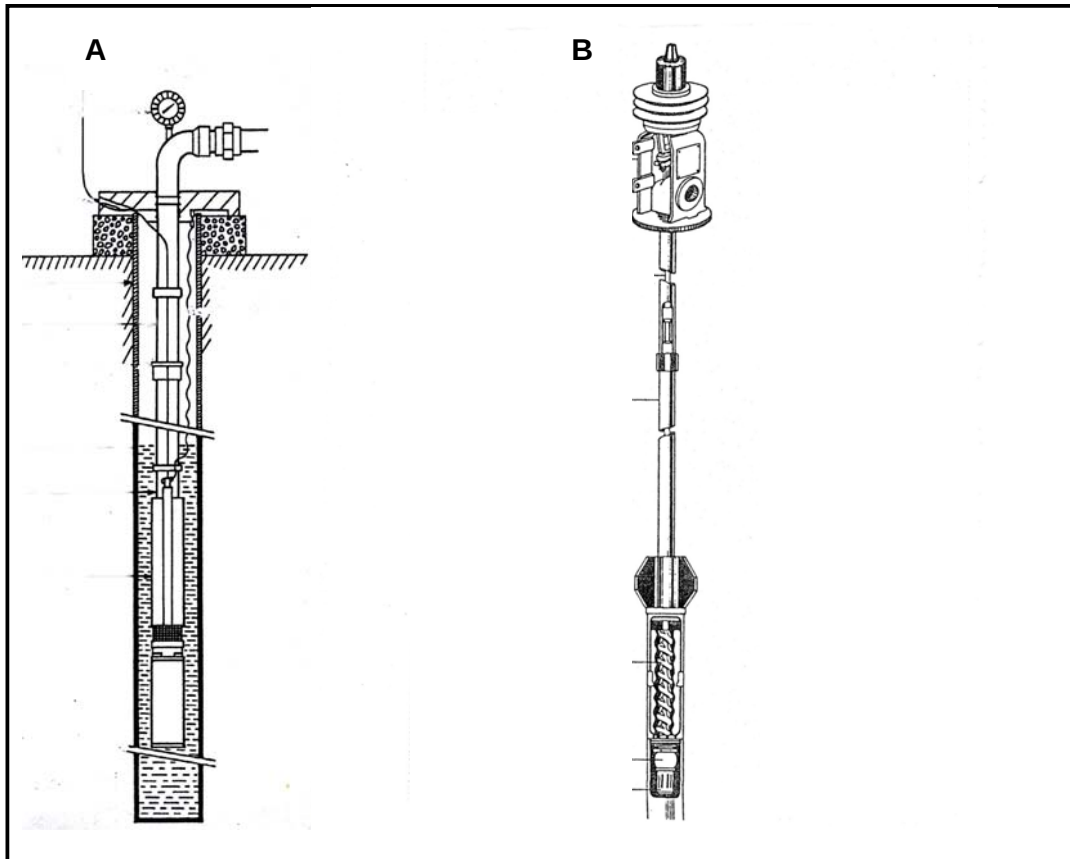
- 5.5 What is the function of the angle grinder shown in the photo below?



(1)  
[35]

**QUESTION 6: WATER MANAGEMENT**

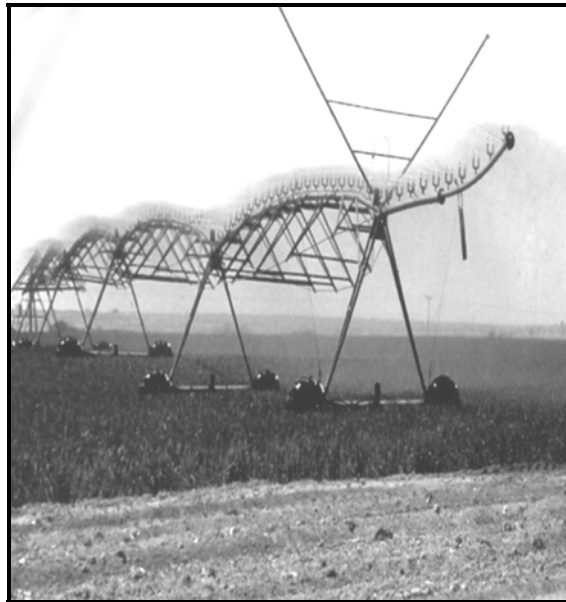
- 6.1 In most circumstances irrigation systems cannot operate without the use of pumps. Pumps must extract the water from the source and deliver it to where it is needed.



- 6.1.1 Identify the pumps labelled A and B. (2)
- 6.1.2 List FIVE criteria that should be considered when choosing an appropriate pump. (5)
- 6.1.3 State TWO disadvantages of the electrical submersible pump. (2)
- 6.1.4 Coarse objects or stones can damage the element of a rotary pump. Identify the component that is installed to prevent this from happening. (1)

- 6.2 The use of self-driven irrigation systems simplifies the labour-intensive task of providing water to crops. The farmer must have extensive knowledge about the working and maintenance of these watering systems because the equipment is very expensive and complicated. Great losses can occur if these systems are not calibrated correctly.

Study the photograph below of one of these types of irrigation systems and answer the questions that follow.



- 6.2.1 Briefly explain why this irrigation system can be called a labour-saving system? (2)
- 6.2.2 Give a reason why the water pressure should be kept constant from the centre of the pivot to the end of the pivot. (2)
- 6.2.3 The centre pivot works on the basis that the irrigation line turns around a centre pivot on wheels. The outer wheels of the system will turn much faster than the inner wheels due to the wider turning circle.
- Briefly explain how the quantity of water that is applied along the length of the pivot is regulated when you take this unequal wheel speed into account. (2)
- 6.2.4 Name TWO fertilisers used in crop production that must never be applied using a centre pivot irrigation system. Motivate your answer in both cases. (4)
- 6.2.5 Name an easy method of communication that a farmer may use to start or stop the centre pivot irrigation system over long distances. (1)
- 6.2.6 Discuss THREE factors that should be considered when laying pipes below the surface of the soil, to prevent problems at a later stage. (6)

6.3 It is crucial to supply fresh drinking water to animals.

6.3.1 Name a device that can be used to supply water to chickens. (1)

6.3.2 State TWO criteria that should be kept in mind when installing drinking water for animals. (2)  
[30]

**TOTAL SECTION B: 155**

**GRAND TOTAL: 200**

**AGRICULTURAL TECHNOLOGY****ANSWER SHEET****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 |

**TOTAL SECTION A: (15 x 3)      45**