



# education

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Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**AGRICULTURAL TECHNOLOGY**

**FEBRUARY/MARCH 2009**

**MARKS: 200**

**TIME: 3 hours**

**This question paper consists of 16 pages and 1 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 these multiple-choice questions.

2.3 Place the COMPLETED ANSWER SHEET in 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 Start EACH question on a NEW page.

3.4 Number the answers correctly according to the numbering system used in this question paper.

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 – 1.15) on the attached ANSWER SHEET.

Example:

1.0	<del>A</del>	B	C
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1.1 Which ONE of the following statements is INCORRECT?

- A Fire-fighting equipment that is not in use must be emptied.
- B The hoses of fire-fighting equipment may never come into direct contact with open flames.
- C Protect the fuel tank of a fire-fighting vehicle from direct heat, flames or damage. (3)

1.2 A vehicle that has broken down on a road at night should be clearly visible to other road users by placing ... in front and behind the vehicle.

- A red flags
- B red reflector triangles
- C stones (3)

1.3 Which ONE of the following symbols indicates a third-angle orthographic projection?

- A 
- B 
- C  (3)

1.4 When a hazardous substance like acid has been spilled it can be cleaned by ...

- A neutralising it with vinegar, leaving it until it is dry, and then removing it.
- B washing it with clean distilled battery water.
- C neutralising it with a solution of water and bicarbonate of soda. (3)

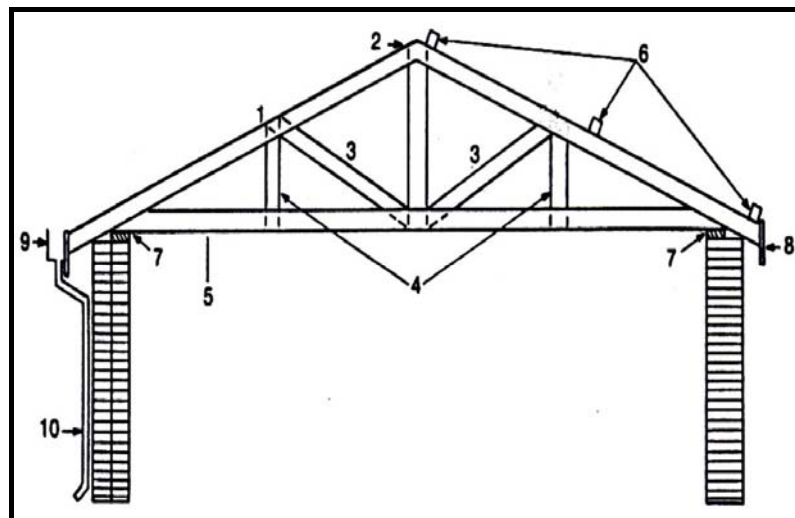
- 1.5 The reason why the exhaust pipe of a tractor extends higher than the head of the driver is to ...
- A reduce noise pollution.
  - B prevent the driver from inhaling poisonous exhaust fumes.
  - C prevent rainwater from entering at the top of the exhaust pipe. (3)
- 1.6 Galvanised metals are sprayed with an undercoat if they are to be spray-painted in order to ...
- A prevent the metal from corroding underneath the paint.
  - B help the paint stick better to the galvanised metal.
  - C protect the galvanised metal against the corrosive agents in the paint. (3)
- 1.7 All electrical appliances and machines used on the farm must be earthed to prevent ...
- A the operator from receiving an electrical shock.
  - B vibrating.
  - C damage to the machine during a short circuit. (3)
- 1.8 A major disadvantage of using solar energy systems to produce electricity on the farm is that it ...
- A generates alternating current that cannot be used to drive direct current motors.
  - B needs a battery system to store energy.
  - C delivers a high power output that can damage small electrical appliances. (3)
- 1.9 Which ONE of the following materials can be used to produce a replacement bush for worn or damaged bushes?
- A Teflon
  - B PVC
  - C Polystyrene (3)
- 1.10 The reason for placing insulation material in the ceiling of a building is to ...
- A prevent heat from escaping through the ceiling during cold weather.
  - B keep the building cooler during hot weather.
  - C All the above-mentioned (3)
- 1.11 The Welger and Vermeer system is associated with ...
- A round balers.
  - B combine harvesters.
  - C the three-point lift system of a tractor. (3)

- 1.12 The double-acting hydraulic cylinder is used effectively where the ...
- A implement is positively controlled in two directions.
  - B weight of the implement forces the piston to return to its original position.
  - C workload is heavy. (3)
- 1.13 Who was the designer of the three-point mechanism that is currently being used on all tractors?
- A Harry Ferguson
  - B Henry Ford
  - C Dear John (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 According to legislation, a ... must always be installed in a pipeline if water is pumped from rivers, streams or dams.
- A foot valve
  - B water-flow meter
  - C pressure regulating valve (3)

**TOTAL SECTION A: 45**

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

- 2.1 Tinned or galvanised wire is generally used on a farm for various purposes.
- 2.1.1 Give a reason for the tinning or galvanising of fence wire. (1)
- 2.1.2 Describe the *galvanising process of wire*. (2)
- 2.1.3 Name TWO important procedures that must be followed before galvanised roof plates are painted. (2)
- 2.1.4 Security fences can be made from various types of wire. Name THREE of these types of wire. (3)
- 2.2 Adhesives play an important role in everyday repair jobs on the farm.
- 2.2.1 Name the TWO most important aspects to be considered in the choice of an adhesive. (2)
- 2.2.2 Describe the difference between *cohesion* and *adhesion* when applying adhesives. (2)
- 2.3 Roof trusses are made from pine wood, and are used for the erection of various types of roofs on the farm.



- 2.3.1 Name the parts of the roof truss numbered 2, 3 and 5 in the sketch above. (3)
- 2.3.2 Briefly explain why triangular shapes are used in the design and construction of roof trusses. (2)
- 2.3.3 Give TWO reasons why pinewood is used for the manufacturing of roof trusses. (2)

- 2.4 Design and sketch an effective handling facility for cattle. The kraal must be used to handle animals when they are inoculated, branded, sorted or loaded and must also have a facility to keep the animals for a day or two when necessary.

Your freehand drawing must include the following:

- A TOP VIEW that shows the position of the kraal, gates, water points, feeding troughs, crush pen and loading ramp. (6)
- Indicate the scale of the drawing. (1)
- Marks will be allocated for accuracy, scale and neatness. (2)

- 2.5 The posts of the kraal mentioned in QUESTION 2.4 must be concreted into the ground so that animals cannot push the posts down and escape.

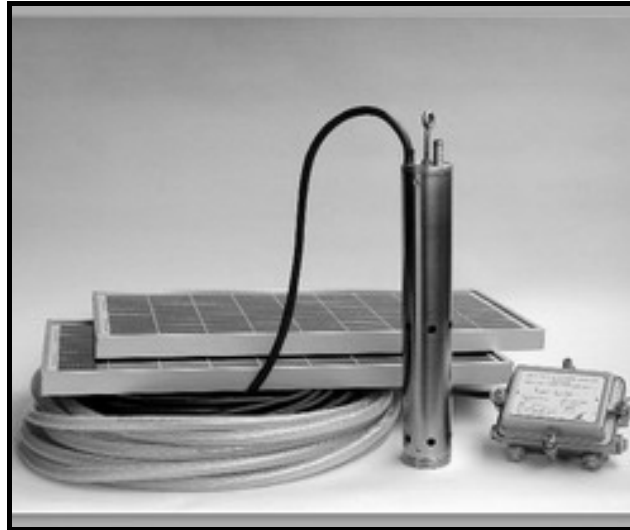
- 2.5.1 Name the basic materials needed for this concrete mixture and indicate the mixing ratio. (4)

- 2.5.2 Why can concrete not be poured during a very cold winter's day when the temperature is below 0 °C? (3)

**[35]**

**QUESTION 3: ENERGY**

3.1 The diagram below shows a submersible pump that uses solar energy.



3.1.1 Name the cells that transform light energy into electrical energy. (1)

3.1.2 The solar panels must be installed in such a way that the pump works effectively on a clear, sunny day.

Describe the principles that must be remembered when installing these solar panels. (5)

3.1.3 Compare, in table form, the advantages of solar energy over coal-generated electricity that can be purchased from the national supplier. (8)

3.1.4 One of the disadvantages of the use of alternative energy sources is that it cannot function when the energy source is not available.

Discuss this problem and provide a possible solution. (2)

3.2 Briefly explain the term *biofuel*, and give TWO examples. (3)

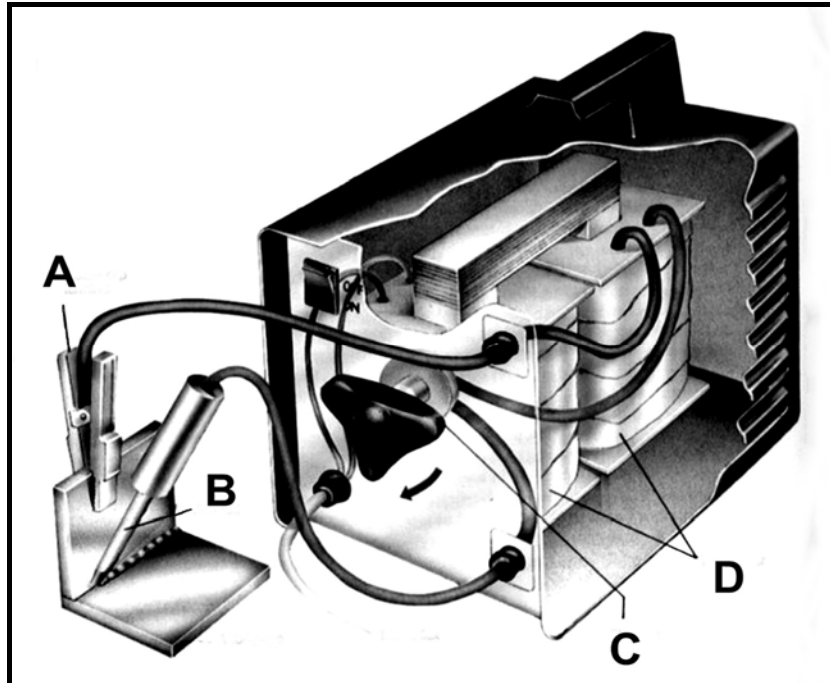
3.3 What type of current is generated by a wind generator? (1)

**[20]**



**QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES**

4.1 Study the sketch below showing a machine that is used to build metal structures and to repair equipment on a farm. Answer the questions that follow.



4.1.1 Name this type of machine. (1)

4.1.2 What is the function of the part labelled D? (1)

4.1.3 Briefly describe the process of striking an arc. (6)

4.1.4 Name TWO types of metal that can be welded effectively with this type of welder. (2)

4.1.5 What is the welding joint on the project in the sketch called? (1)

4.1.6 When examining the completed welding joint, it is found that there are small holes in the joint.

(a) What is this welding defect called? (1)

(b) Explain the reason for this welding defect. (3)

4.2 Welding downward in a vertical position, may sometimes prove to be a problem, because the molten metal of the puddle will tend to run down.

4.2.1 Describe the correct welding procedure of vertical welding in the downwards direction with an arc-welding machine. (5)

4.2.2 What is the purpose of the slag that is formed on the welding run? (3)

- 4.3 List the effects on the welding process if the welding-rod coating is absent. (5)
- 4.4 Name TWO effects of poor storage conditions on welding electrodes. (2)
- 4.5 Choose a word from COLUMN B that matches a description in COLUMN A. Write only the letter (A – G) next to the question number (4.5.1 – 4.5.5) in the ANSWER BOOK.

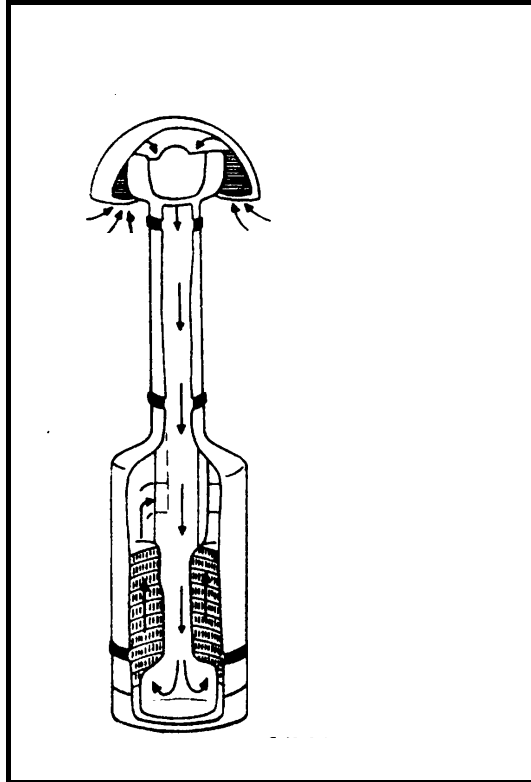
COLUMN A	COLUMN B
4.5.1 Small welds at the ends of two pieces of metal	A welding bead
4.5.2 Puddle of melted metal	B MIG welding
4.5.3 Covers the welding rod	C flux
4.5.4 Acetylene equipment	D tag weld
4.5.5 Argon, helium and carbon dioxide	E right-hand thread
	F black
	G maroon

(5 x 1)

(5)  
[35]

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

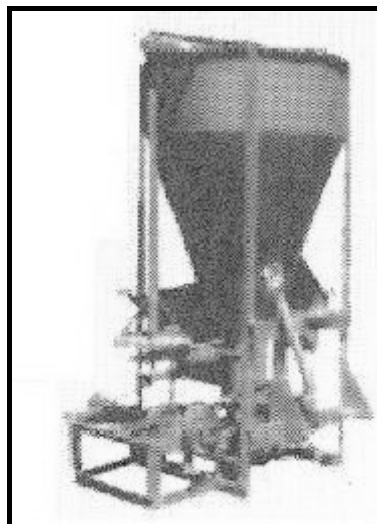
5.1 The illustration below shows an oil bath air cleaner that is used on a tractor. Engines cannot perform properly without an air cleaner.



5.1.1 Name TWO qualities of a good air cleaner. (2)

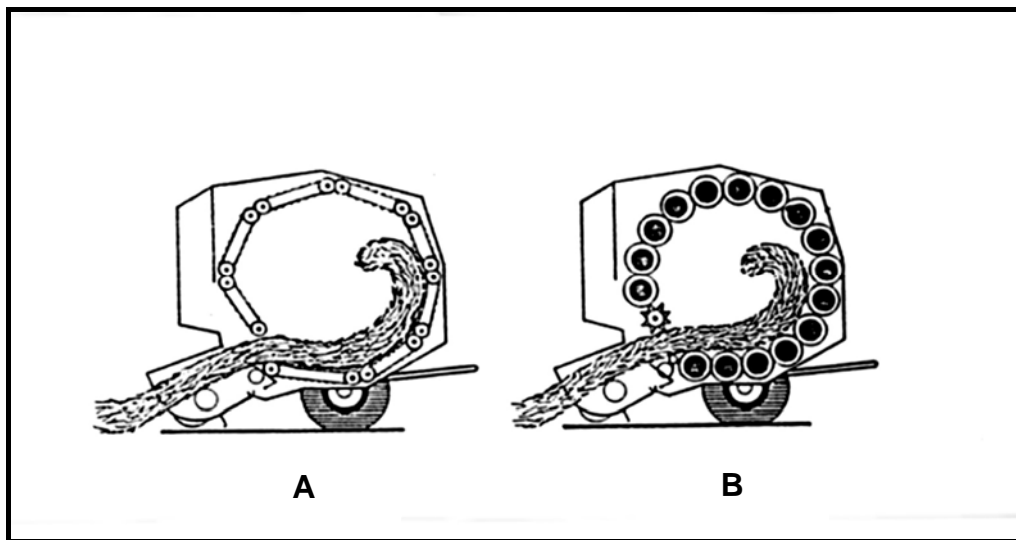
5.1.2 In order to work efficiently, several hints must be kept in mind regarding the air filter of a tractor. Name FOUR of these hints. (4)

5.2 A hammer mill is one of the necessities on a farm. It helps a farmer to mill his own feed and saves money in the process.



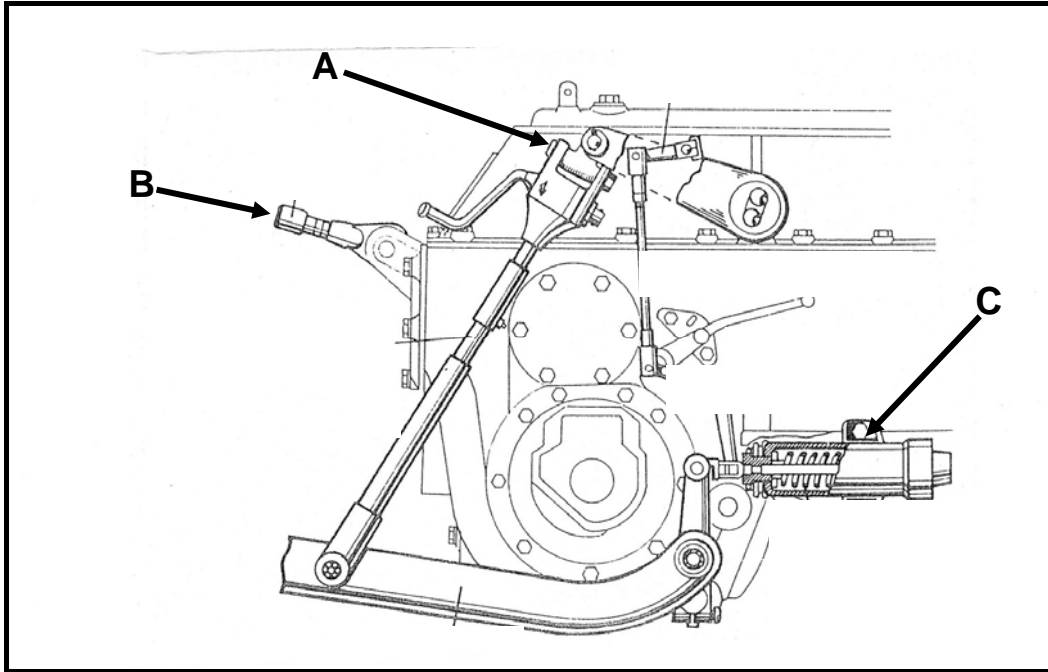
- 5.2.1 Name FOUR points that must be taken into account when a hammer mill is being installed. (4)
- 5.2.2 Maintenance is very important to prolong the lifespan of a hammer mill. Name FOUR factors that must be kept in mind when maintenance is carried out on a hammer mill. (4)
- 5.2.3 Name FOUR points that have to be considered when the hammer mill is attached to the power take-off shaft of the tractor. (4)

5.3 Study the two sectional views of Welger type balers with different roll mechanisms below.



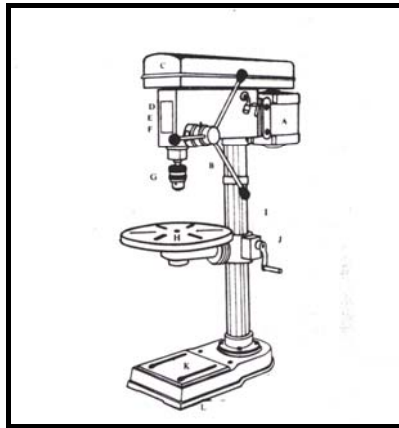
- 5.3.1 What is the difference between baler A and baler B? (2)
- 5.3.2 Describe the process of bale binding in the round baler. (3)

5.4 The system below is an integral link between the implement and the tractor, and its working and function must be clearly understood by the persons who operate and service the tractor.



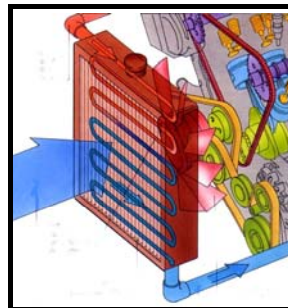
- 5.4.1 Describe the function of the component labelled A. (1)
- 5.4.2 Arrow B shows where the top link is connected. What is the function of the top link? (1)
- 5.4.3 Name the device labelled C and briefly describe its function. (2)
- 5.4.4 Name FOUR advantages of the use of transmission oil in a tractor's hydraulic system. (4)

5.5 The pedestal drilling machine is an important item in the workshop. It facilitates the drilling process.



Certain settings must be made before this machine can be used for drilling. Name TWO settings that are very important to operate this machine successfully. (2)

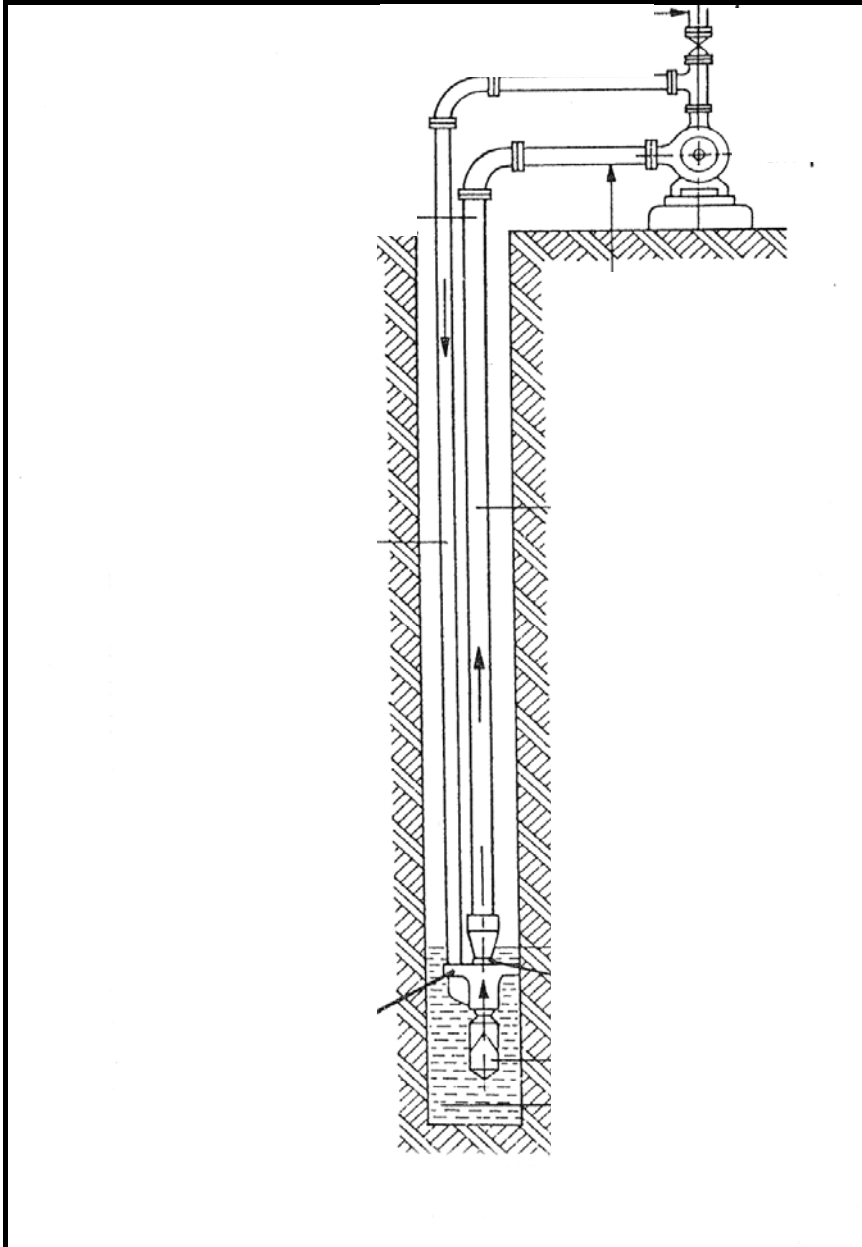
5.6 Before the ploughing, planting or harvesting season starts the farmer must make sure that all his vehicles and machines are in good working order. Defective cooling systems can cause great financial losses.



Blocked radiators can cause engines to overheat. How would you prevent a radiator from becoming blocked? Name TWO methods. (2)  
[35]

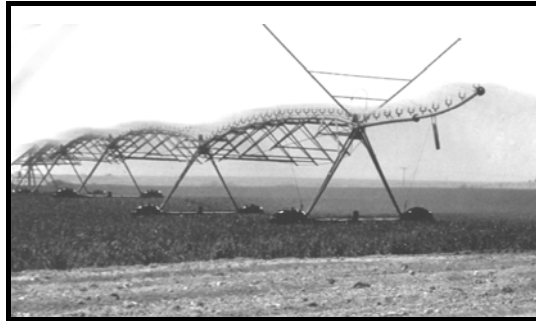
**QUESTION 6: WATER MANAGEMENT**

6.1 Most pumps are used to pump water from a source to another place where it is needed.

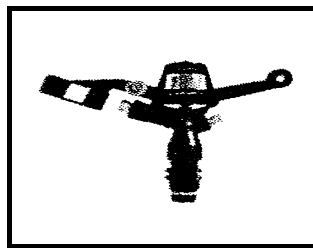


- 6.1.1 Identify the pump shown in the figure above. (1)
- 6.1.2 Name FOUR advantages of the pump shown above. (4)
- 6.1.3 Describe THREE safety measures when working with electrical pumps and motors. (3)
- 6.1.4 Name TWO disadvantages of the rotary pump. (2)

- 6.2 Because of the great demand and scarcity of water in South Africa, the effective use thereof is enforced. Irrigation systems should be designed in such a way that water is applied efficiently for a specific system.



- 6.2.1 When will sprinkler irrigation be preferred over flood irrigation? (3)
- 6.2.2 Name FIVE advantages of the irrigation system referred to in the photo above. (5)
- 6.2.3 Identify the system installed at the pump station to prevent blockages of the sprayer nozzles by foreign material. (1)
- 6.3 Sprinklers form an integral part of irrigation systems.



- 6.3.1 What is the function of the sprinkler head in the photo? (1)
- 6.3.2 Name TWO effective materials used to manufacture the sprinkler head as indicated in the picture. (2)
- 6.4 Describe how an open drainage system is used in irrigation fields. (2)
- 6.5 Animals cannot survive without the availability of a reliable water source.
- 6.5.1 Certain requirements are of value when water troughs are installed. Name any FOUR requirements. (4)
- 6.5.2 Describe the device that can be used in a trough to prevent the water from overflowing. Give a reason for your answer. (2)
- [30]**

**TOTAL SECTION B: 155**

**GRAND TOTAL: 200**



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

<b>A</b>
<b>B</b>
<b>TOTAL</b>

**EXAMINATION NUMBER:** \_\_\_\_\_**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

(15 x 3) (45)

**TOTAL SECTION A: 45**