



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

AGRICULTURAL TECHNOLOGY

EXEMPLAR 2008

MARKS: 200

TIME: 3 hours

This question paper consists of 18 pages and an answer sheet.

INSTRUCTIONS AND INFORMATION**1. GENERAL INSTRUCTIONS**

- 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 Number the answers correctly according to the numbering system used in this question paper.
- 3.4 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 correct answer and make a cross (X) over the appropriate letter (A – C) next to the question number (1.1 – 1.20) on the attached ANSWER SHEET.

Example:

1.0	☒ A	B	C
-----	---------------------------------------	---	---

- 1.1 When working in a workshop that has insufficient ventilation there is a chance that a person can suffer from ... poisoning because of the exhaust emissions from petrol engines.

A nitrogen
B carbon monoxide
C nitrate

- 1.2 When fitting a new pulley on a shaft the hydraulic ... must be used to remove the old pulley from the shaft.

A press
B lift
C wrench

- 1.3 All trailers and heavy vehicles used on the farm that must be driven on public roads must have ... on the back and sides to make them more visible to other road users, as stipulated by traffic regulations.

A paint
B yellow reflector strips
C red triangles

- 1.4 Which ONE of the following statements is INCORRECT?

A Passengers are allowed to sit on parts of a tractor while it is in motion.
B All tractors using public roads must have roadworthiness certificates.
C All tractors that are used on public roads must have indicator lights.

- 1.5 The illustration below shows a warning sign that can be put up against a building. What is stored in a building if this sign is displayed on it?



A Radioactive materials
B Explosive materials
C Poisonous substances

- 1.6 When servicing a petrol engine on the farm, a ... is used to measure the point clearances in the distributor of the engine.
- A vernier calliper
 - B feeler gauge
 - C micro meter
- 1.7 A device in the three-point mechanism of the tractor that compensates for hard or soft patches in the land by lifting or lowering the plough automatically:
- A Sensitivity element
 - B Levelling box
 - C Top link
- 1.8 Brake fluid is used in the hydraulic breaking system of a motor vehicle because it is not ...
- A flammable.
 - B poisonous.
 - C compressible.
- 1.9 When an electric star-delta motor has a short-circuit in its windings, it ceases to work.
- A short-circuit can be detected by a distinctive ... in the motor.
- A smell
 - B colour
 - C taste
- 1.10 An alternative energy source that uses the energy from the sun to generate electrical energy:
- A Nuclear energy
 - B Solar energy
 - C Wind energy
- 1.11 Which ONE of the following statements is CORRECT about centre-pivot irrigation?
- A Centre-pivot irrigation has a limit to its length and long centre pivots tend to be ineffective.
 - B A centre-pivot system can be best used on a large, sloping land.
 - C All the nozzles of the centre pivot are of the same size.

- 1.12 ... is a modern technologically advanced tool that the farmer can use to locate exact spots on the farm.
- A A measuring wheel
 - B GPS
 - C Aerial photography
- 1.13 A device used on implements like balers and harvesters to protect the pick-up roller if it is obstructed by an object:
- A Shear bolt
 - B Ratchet plate
 - C Slip clutch
- 1.14 What device is built into the PTO drive shaft between the tractor and the mower to compensate for the angled movement of the shaft?
- A Helical gear
 - B Universal joint
 - C Top link
- 1.15 The diameter of a tractor's belt pulley is 250 mm and it revolves at 1 200 r/min. What should the diameter of the belt pulley be if the drive pulley of a hammer mill rotate at 800 r/min?
- A 250 mm
 - B 375 mm
 - C 500 mm
- 1.16 The ... pump can effectively be used to draw water from deep boreholes where no rods are required and where no electricity is available.
- A submersible
 - B rotary
 - C jet
- 1.17 The chemical process that takes place when electroplating is done:
- A Electrolysis
 - B Rust
 - C Corrosion through acids
- 1.18 The steel bushes of equipment used on a farm that wears easily, can be replaced by ..., because it is wear resistant, cheaper and more durable.
- A epoxy
 - B polystyrene
 - C teflon

- 1.19 The ... welder is the best welder to use when welding thin metal plates at low temperatures.
- A arc
 - B CO₂
 - C oxy-acetylene
- 1.20 You can use a ... to trace 20 pieces of sheet metal, which you would like to cut to the same shape and exact specifications.
- A ruler
 - B measuring tape
 - C template

TOTAL SECTION A (20 x 2): 40

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

2.1 Galvanised mild-steel plates are commonly used on a farm for various purposes.

2.1.1 Give ONE reason for galvanising mild-steel plates. (1)

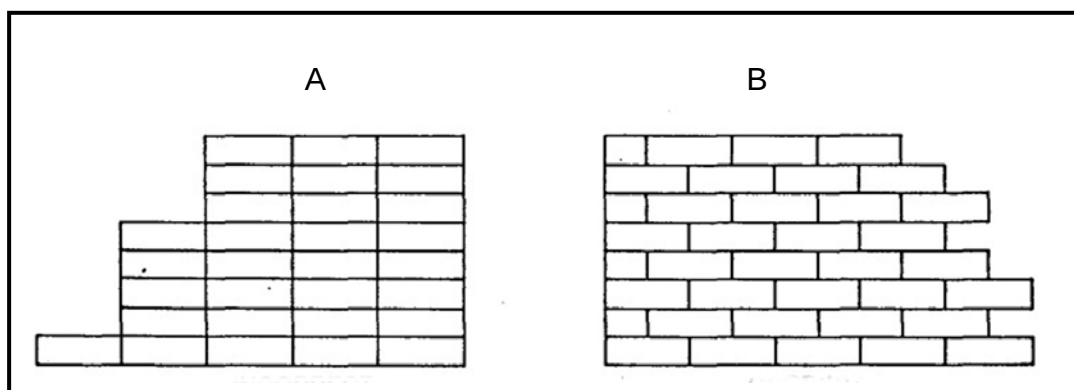
2.1.2 Describe the process of galvanising mild-steel plates. (3)

2.1.3 Name TWO uses of galvanised plates. (2)

2.1.4 Provide a name for the chemical process that occurs when the surface of mild steel turns red when exposed to the elements. Briefly explain this process. (5)

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

2.2 A farmer needs to take the applicable basic building rules into account when he wants to build something. Faulty constructions can lead to great losses due to the high cost of building material.

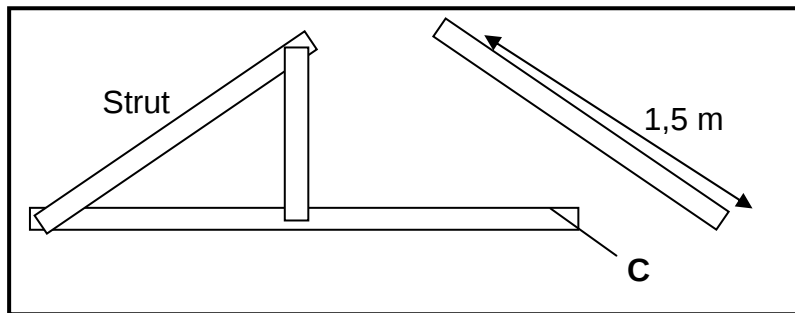


2.2.1 Identify the best bonding method used for the construction of a brick wall, as shown above in diagrams A and B. (1)

2.2.2 Discuss the reasons for your choice in QUESTION 2.2.1. (2)

2.2.3 Name THREE requirements for the foundation when building this 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 main function of a roof truss? (1)
- 2.3.2 Name the part of the roof truss that is labelled C. (1)
- 2.3.3 Various methods can be used to join the different sections of the roof trusses. Name the method that is used to join these sections quickly and effectively without splitting the beam. (1)
- 2.3.4 Discuss the reasons why triangular constructions are used in the design of roof trusses. (2)
- 2.3.5 Name the type of insulation material that can be used between the roof and ceiling to keep the shed cool in summer and warm in winter. (1)
- 2.4 Make a neat free-hand drawing of a ledged and braced batten door. Your drawing must include the following:
- 2.4.1 Front view (2)
- 2.4.2 Left view (1)
- 2.4.3 Back view (1)
- 2.4.4 Measurements (1)
- 2.5 Give a valid reason for each of the following statements:
- 2.5.1 Clear fibreglass roof plates are used on the roof of a greenhouse. (1)
- 2.5.2 Exposed water pipes tend to freeze during winter and are therefore insulated. (1)
- 2.5.3 An effective game fence must be 2,4 metres high. (1)
- 2.5.4 The wires in a fence must not be tensioned too much on a warm day. (1)
- 2.5.5 The best shape that can be used for the construction of tunnels is a half-round shape. (1)

[35]

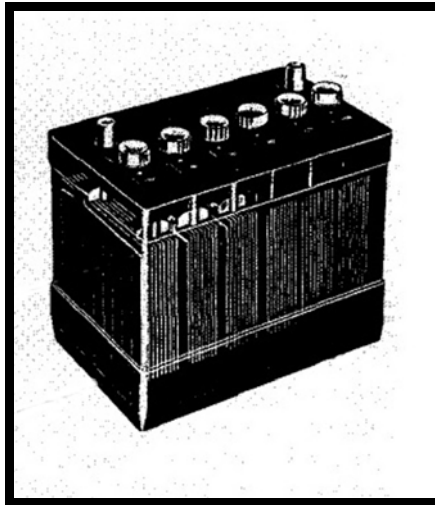
QUESTION 3: ENERGY

3.1 The diagram below shows structures that are used to produce electric energy.



- 3.1.1 Name the energy source that these structures utilise to generate electric energy. (1)
- 3.1.2 Briefly describe how these structures generate electrical energy. (2)
- 3.1.3 The above structures can be up to a 100 metres high with blades as large as aeroplane wings, with the result that strong winds and storms can seriously damage the construction. What can be done to prevent the blades from damage when turning too fast during a storm? (2)
- 3.1.4 Which apparatus can be used to change the direct current produced by the wind generator, to alternating current, to be used on the farm? (1)
- 3.1.5 State TWO advantages and TWO disadvantages of this type of energy source named in QUESTION 3.1.1. (4)
- 3.1.6 How can you store the energy produced from this device for use during windless days? (1)

3.2 The battery as shown in the illustration is used on the farm as a source of energy.



3.2.1 Identify the number of cells in the above battery. (1)

3.2.2 Describe the THREE most important steps that must be remembered when servicing or cleaning a battery of a tractor. (3)

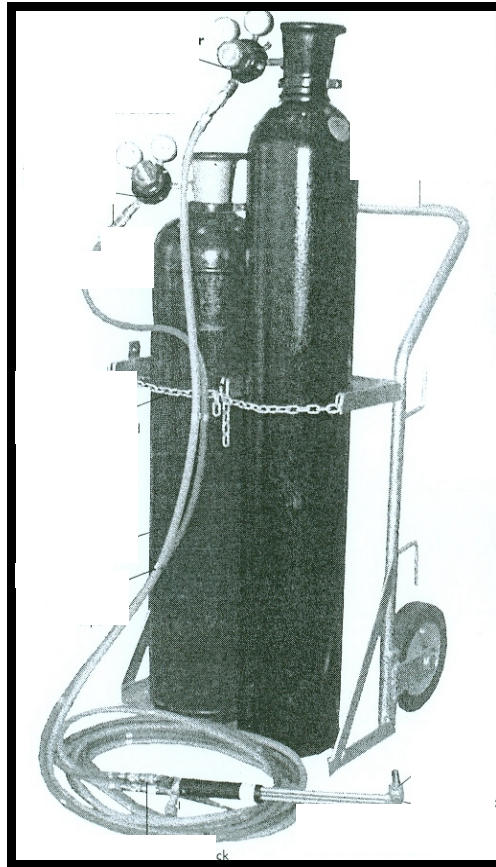
3.3 Electrical fences are used on farms for self-protection and the protection of property.

3.3.1 Name any FOUR safety measures that need to be taken when erecting electrical fences on a farm where people may come into contact with them. (4)

3.3.2 What type of material can be used as an insulator between the wires and the iron posts to prevent a short-circuit? (1)
[20]

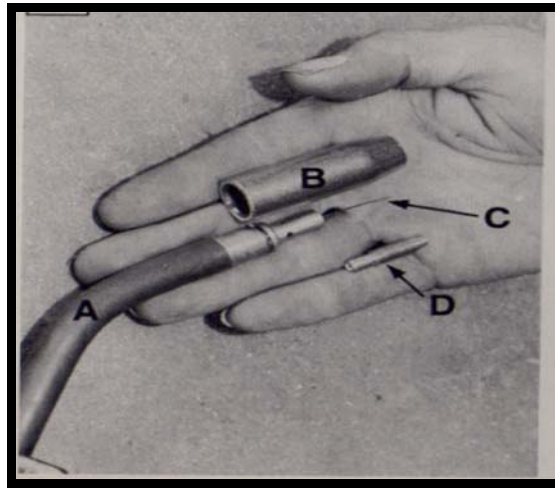
QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES

- 4.1 The following illustration shows a gas welding set that is regularly used on a farm. Different welding methods are used on different metals. The type and thickness of the metal plays a very important role in choosing the correct welding method.



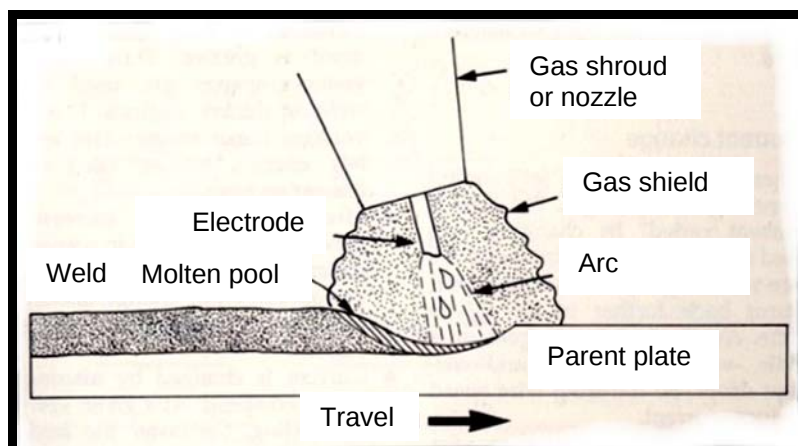
- 4.1.1 What device is used to prevent a flame from going back through the pipe to the cylinder of the oxy-acetylene set causing an explosion? (1)
- 4.1.2 Name and describe the THREE different welding techniques that can be used by the operator when using the above welding set. (6)

- 4.2 MIG welding is an arc welding process in which individual standard electrodes are replaced by a continuously fed wire. Inert gas shield replaces the flux of the electrode.



- 4.2.1 Identify the FOUR different parts of the MIG welding apparatus labelled A to D as shown in the illustration above. (4)
- 4.2.2 Name the THREE types of gases used in MIG welding. (3)
- 4.2.3 Name the type of current that is used in this welding process. (1)
- 4.2.4 Discuss FIVE advantages of MIG welding compared to that of normal arc welding. (5)
- 4.2.5 At what angle must the nozzle be held when welding with an MIG welding apparatus? (1)

- 4.3 The diagram below shows the MIG welding process.



- 4.3.1 What is the function of the shielded gas as shown in the diagram? (3)
- 4.3.2 What substance can be applied to the nozzle to prevent spattering or to prevent the electrode from getting stuck to the nozzle? (1)

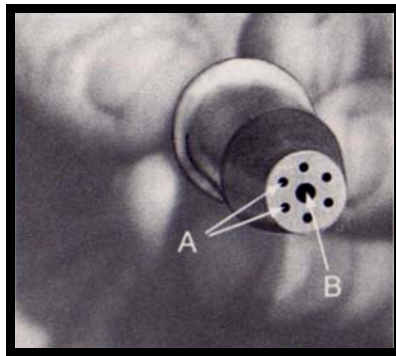
4.4 The converter welding machine is the latest type of welding machine on the market and can be used very effectively on the farm for various welding jobs.

4.4.1 Name the type of current that this type of welder requires. (1)

4.4.2 Name a non-ferrous metal that can be easily welded with this welding machine, if the correct welding rods are used. (1)

4.4.3 State TWO main advantages of the converter welding machine. (2)

4.5 The illustration below shows the nozzle of an oxy-acetylene set.



4.5.1 What is this piece of equipment used for? (1)

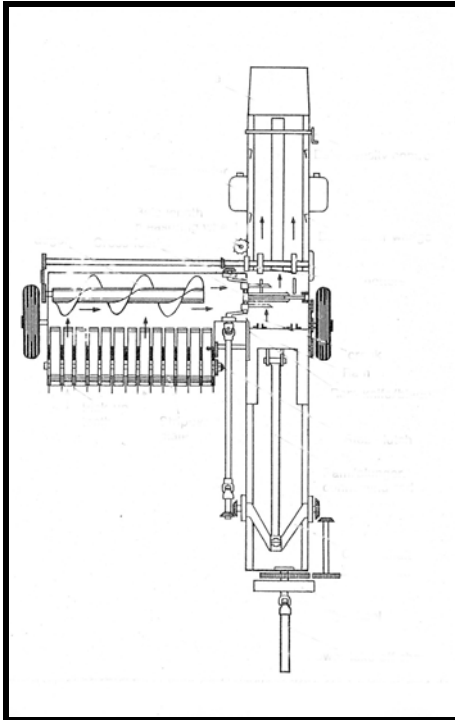
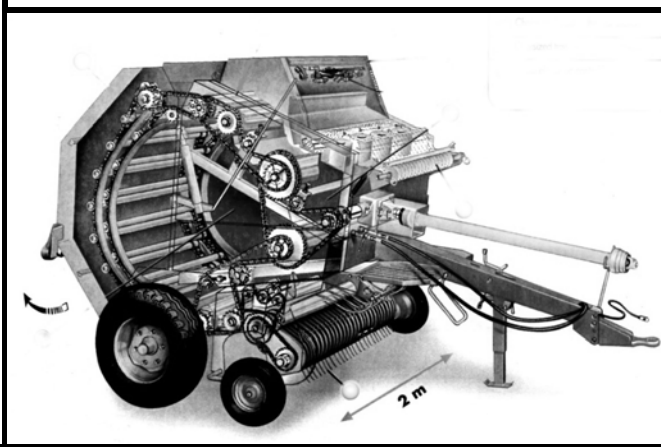
4.5.2 Study the illustration and describe the working of this nozzle by referring to labels A and B. (4)

4.5.3 What must be done to the hole on the tip of the cutting nozzle if it produces a feathery flame? (1)

[35]

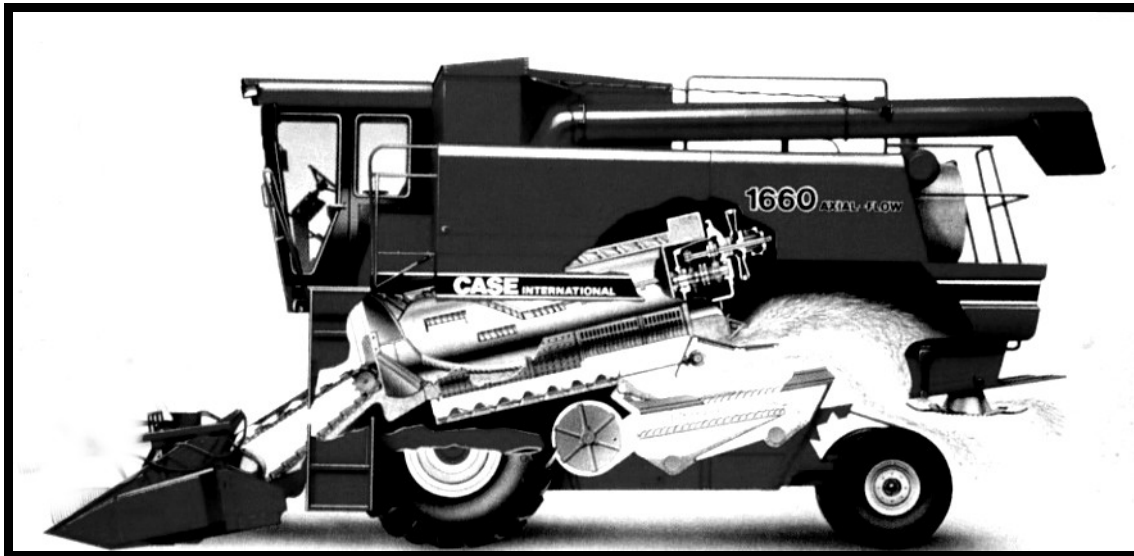
QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT

5.1 The illustration below shows two balers (A and B) that are used to make hay bales on the farm.

A**B**

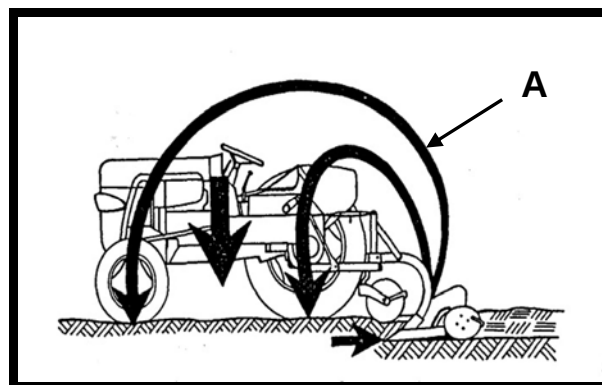
- 5.1.1 Name the balers A and B. Briefly describe the difference in the shape of their bales. (4)
- 5.1.2 Compare TWO advantages of balers A and B in tabular form. (4)
- 5.1.3 How is the density of a bale in baler B determined? (1)
- 5.1.4 Name any FOUR procedures that must be followed when a baler is stored for a long period of time. (4)

- 5.2 The diagram below shows a modern combine harvester-thresher used on a farm to harvest crops like wheat, sunflower and maize.



- 5.2.1 Describe any THREE reasons why you would prefer using this combine harvester-thresher. (3)
- 5.2.2 Discuss the role that computers and satellite positioning systems play in technologically advanced combine harvesters. (4)
- 5.2.3 Name THREE possible problems that may influence the harvested product when using the combine harvester. (3)

- 5.3 The illustration below shows a tractor pulling a plough.



- 5.3.1 Analyse the illustration and briefly describe what A illustrates. Give a reason for your answer. (2)
- 5.3.2 Explain what will happen if the top link between the tractor and plough is removed. (2)
- 5.3.3 Name THREE ways to change the mass displacement of a tractor positively. (3)

5.4 Study the following data taken from a typical tag on an electric motor.

kW 7,5		r/min 1435	
A 16,6		CONN/KON 	
No. 03120/008LB Nr.			
FRAME DX 132 M RAAM		MYG B3 MONT	
IP 55	INSUL F	DUTY S1	
IC 0141		DIENS	
BEARINGS		DE. 6208Z	
LAERS		N.D.E. 6208Z	
PH 3	380 VOLT	No MOD	
F	50 Hz	Nr	

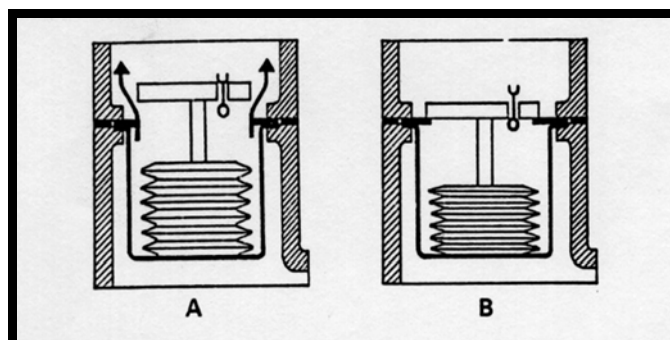
5.4.1 Why must all electric motors be fitted with such a tag above? (1)

5.4.2 What is the current used for this motor as indicated on the tag above? (1)

5.4.3 How is the starter connected to the motor according to the tag above? (1)

5.4.4 All electric motors manufactured in South Africa must comply with certain standardised criteria set by the SABS. Name TWO of these prescribed standards applicable to the axles of electric motors. (2)

5.5 The diagram below shows thermostat A in an open position and thermostat B in a closed position.

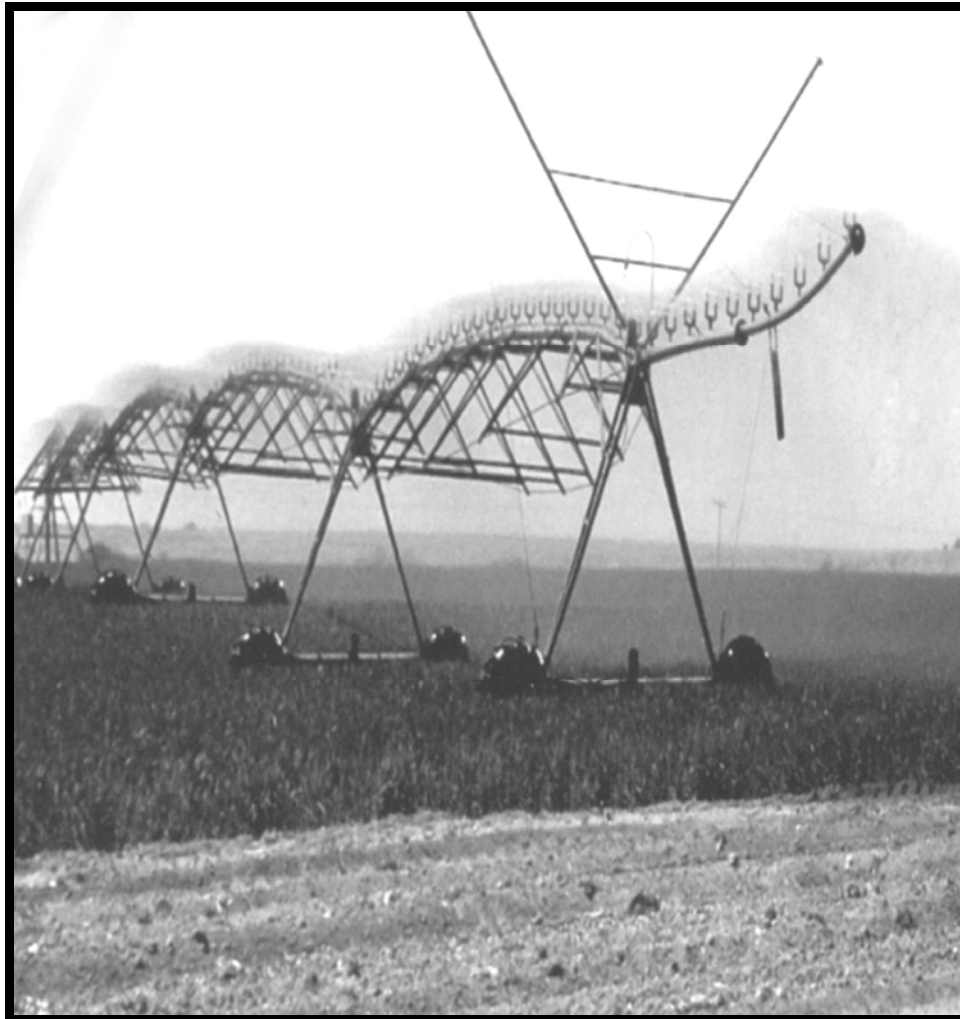


5.5.1 What is the function of this type of thermostat? (2)

5.5.2 Describe the working of the concertina-type thermostat by referring to the above diagram. (3)
[40]

QUESTION 6: WATER MANAGEMENT

- 6.1 Irrigation is a very important practice in the agricultural environment. A farmer must have extensive knowledge of the different irrigation methods and systems that can be used.



- 6.1.1 Identify the above irrigation system. (1)
- 6.1.2 State FIVE advantages of the irrigation system above. (5)
- 6.1.3 Name ONE way of protecting the iron parts of the irrigation system against corrosion (rust). (1)
- 6.1.4 How can theft of electrical cables be prevented? (1)
- 6.1.5 Identify the device installed at the pump station to prevent blockages of sprayers. (1)

- 6.2 Sun energy can provide the electrical current for a 12 volt DC submersible pump that is used in a remote area to provide drinking water for animals.
- 6.2.1 What is the name of these sun-energy cells? (1)
- 6.2.2 State THREE advantages of this type of pump. (3)
- 6.2.3 Describe TWO precautionary measures to keep in mind when servicing these pumps. (2)
- 6.3 Give the correct solution for each of the following statements. Justify your answer with a reason in each case.
- 6.3.1 This pump is used to pump water from rivers or dams and is not a submersible pump. (2)
- 6.3.2 This device can be used to switch a pump on or off over a great distance. (2)
- 6.3.3 The metal from which quick-coupling spray irrigation pipes are manufactured. (2)
- 6.3.4 The type of metal that can be used to manufacture sprayers for irrigation purposes. (2)
- 6.3.5 A qualified person needs to connect electrical wiring to Eskom's distribution network. (2)
- 6.4 Choose from the list below a term or word which best suits, the statement in QUESTION 6.4.1 to QUESTION 6.4.5.
- | |
|--|
| stone drain; septic tank; fish-bone drain; sieve; open drain |
|--|
- 6.4.1 Ditches are dug at regular intervals to a suitable depth to drain free water from waterlogged soil. (1)
- 6.4.2 The bottom of the ditch is loosely packed with large stones, covered with smaller stones and finally with soil. (1)
- 6.4.3 This waste-water management system use biological principles to break down the waste. (1)
- 6.4.4 The lateral drain runs into the main drain at an angle of about 45°. (1)
- 6.4.5 The opening of the drain should be covered with this object. (1)
- [30]**

TOTAL SECTION B: 160

GRAND TOTAL: 200

**AGRICULTURAL TECHNOLOGY
LANDBOUTEGNOLOGIE**

Answer sheet/Antwoordblad

A
B
Total Totaal

Name: _____

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