



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL TECHNOLOGY

NOVEMBER 2010

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 the 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.
 - 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
-----	---------------------------------------	---	---

- 1.1 In metal work the term *annealing* refers to ...
- A a heat treatment process to soften metals for reshaping.
 - B a cold working process to obtain a smooth surface.
 - C atom disruption in the material. (2)
- 1.2 Which ONE of the following is NOT a property that improves the cohesion quality of adhesives?
- A Apply adhesives to both sides of the surface to be joined.
 - B The surface to be joined determines the type of adhesive.
 - C Apply a thick base coat if the surfaces to be joined are very porous. (2)
- 1.3 Nickel, as an alloy element, has the following influence on stainless steel:
- A It improves the amount of toughness
 - B It reduces magnetism
 - C It can be welded well using most welding techniques (2)
- 1.4 Which ONE of the following is NOT a safety mechanism commonly found on baling machines?
- A Slip clutch
 - B Sheer bolt
 - C Handbrake (2)
- 1.5 The role of a GPS system in a modern combine harvester is that of ...
- A pinpointing exact locations in a field.
 - B showing areas of undergrowth in the growing stage of crops.
 - C applying substances to a crop at a variable rate. (2)
- 1.6 The function of the cyclone on a hammer mill is to ...
- A release the dust.
 - B pulverise the fodder.
 - C blow the grounded material through the screen. (2)



- 1.7 A disadvantage of the flat drive-belt is that it ...
A is subjected to stretching.
B is difficult to install.
C cannot be joined. (2)
- 1.8 An example of fixed expenses associated with tractors is ...
A depreciation.
B supervision.
C labour costs. (2)
- 1.9 The welding rod used to weld cast iron is made of ...
A pure nickel.
B tungsten.
C copper. (2)
- 1.10 The type of corrosion that takes place when two different types of metal touch, is called ...
A acidic corrosion.
B electrolysis.
C oxidation. (2)
- 1.11 MIG welding can be done successfully on ... if the correct attachments are used on the welder.
A copper
B aluminium
C cast iron (2)
- 1.12 The energy from the sun, captured in solar panels, is called ...
A photons.
B electrons.
C rays. (2)
- 1.13 A characteristic of a double helical gear is that the gear teeth ...
A run at an angle across the outer circumference of the gear.
B are angled in both directions.
C run laterally across the outer circumference of the gear. (2)
- 1.14 According to fire prevention rules an electrical fire can be extinguished with a ...
A water hose.
B red fire extinguisher.
C dry-powder extinguisher. (2)



- 1.15 The ratio between cement, sand and stone in a standard concrete mixture for heavy foundations is ...
- A 1 : 4 : 4
 - B 1 : 2 : 2
 - C 1 : 3 : 0
- (2)
- 1.16 Pinewood is generally used for the manufacturing of roof trusses because it ...
- A contains a natural insect repellent that prevents insects from attacking the wood.
 - B is relatively cheap.
 - C can be bought from our neighbouring countries.
- (2)
- 1.17 Wooden fence poles can be protected from insects by treating them with ...
- A creosote.
 - B PVA paint.
 - C a solution of salt and lime.
- (2)
- 1.18 The most effective material that can be used as an isolator between the wire and the post of an electric fence, is ...
- A wood.
 - B teflon.
 - C galvanised plates.
- (2)
- 1.19 Which ONE of the following is NOT a property of insulation material used in the roofs of buildings?
- A It should be resistant to rodents and insect pests
 - B It should not give off any odours
 - C It should have a distinctive pink colour
- (2)
- 1.20 A piece of equipment that can be used to determine evapotranspiration in irrigation fields is called a ...
- A thermometer.
 - B tensiometer.
 - C hydrometer.
- (2)

TOTAL SECTION A: 40



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

- 2.1 The photograph below shows a security fence that can be used on a farm to safeguard animals or property.



- 2.1.1 Describe FIVE safety requirements or regulations an electrical fence should adhere to when erected. (5)
- 2.1.2 Name FOUR basic requirements of the warning signboards that must be displayed on an electrical fence. (4)
- 2.1.3 Name THREE factors that can cause electrical leakages/shorts on an electric fence. (3)
- 2.1.4 The hole that is dug for the corner post of an electric fence must be filled with concrete to keep the post upright and sturdy against the combined strain of the fence wires. The hole is a square of 500 mm by 500 mm and it is 900 mm deep.
- Calculate the amount of concrete (cubic metres [m³]) that has to be mixed for the hole, by using the information above. Show ALL the calculations. (5)
- 2.1.5 Name TWO ways in which the electrical equipment of an electrical fence can be safeguarded against lightning damage. (2)

- 2.2 Study the picture of a greenhouse below and answer the questions that follow.



- 2.2.1 Why is this particular shape, consisting of half round and triangular structures, used for the construction of a greenhouse? (2)
- 2.2.2 Name FOUR requirements of the covering material used over this structure. (4)
- 2.2.3 The greenhouse is an expensive structure and it is crucial that regular maintenance is carried out. Production will be jeopardised if the structure fails.
- Name THREE precautionary maintenance practices that should be carried out on a daily basis to prevent the greenhouse from being damaged. (3)
- 2.3 Name THREE precautionary measures which need to be taken into consideration when using synthetic materials, like fibreglass, in construction processes. (3)
- 2.4 Briefly explain why stainless steel is often preferred over mild steel. (2)
- 2.5 Name TWO influences that chromium, as an alloy element, has on stainless steel. (2)

[35]

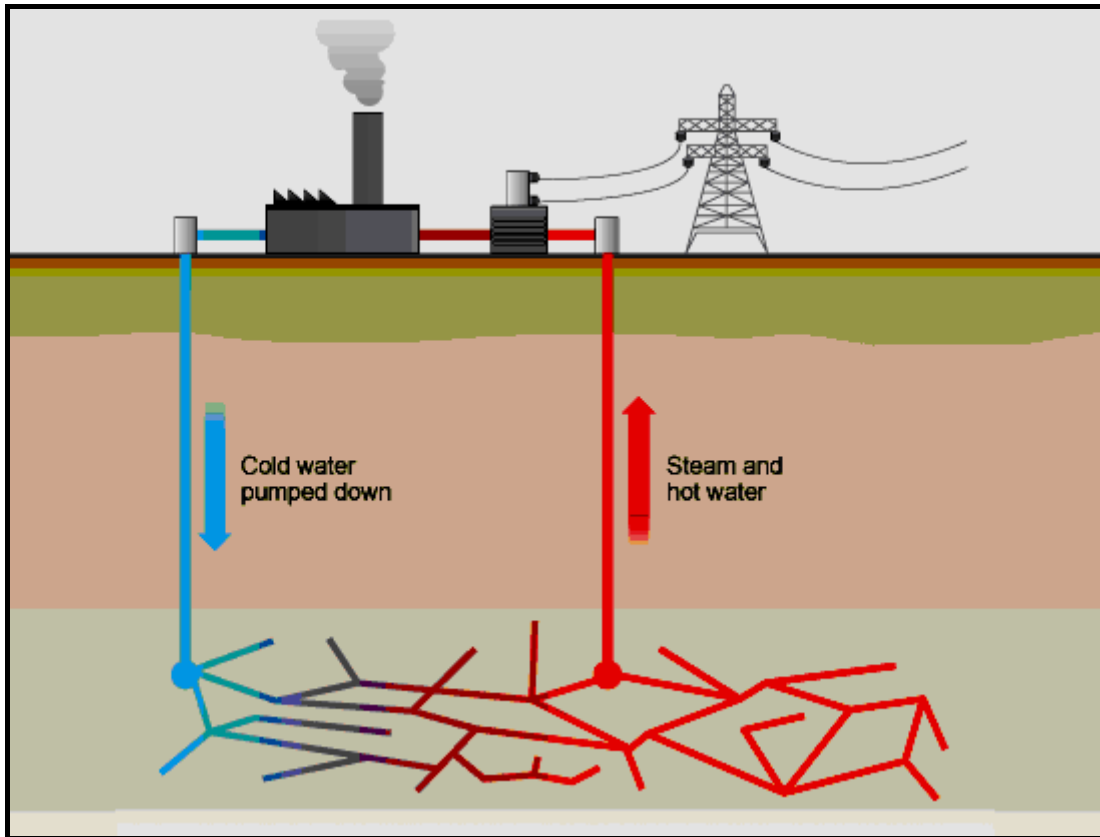
QUESTION 3: ENERGY

- 3.1 Study the illustration below that shows a system that can be used on a farm as an alternative energy source. Answer the questions that follow.



- 3.1.1 Identify the device in the picture above and describe the way in which the device works. (4)
- 3.1.2 Name THREE factors that can have a negative effect on the efficiency of this device. (3)
- 3.1.3 Briefly explain the importance of using alternative energy sources in the agricultural sector. (3)

3.2 The illustration below shows an alternative energy source that provides electricity.



3.2.1 Name the type of energy illustrated in the sketch above. (1)

3.2.2 Indicate the origin of this energy. (1)

3.2.3 Name TWO disadvantages of this type of energy source. (2)

3.3 A farmer bought a farm in a remote part of the country where no electricity is available. After the farmer did some research, it was concluded that a small hydro-electric power system could be installed in a water stream that is available on a high-lying part of the farm.

Design and indicate the basic components of such a simple hydro-electric power system for the farm by means of a freehand sketch.

The following items must appear in the drawing with their labels:

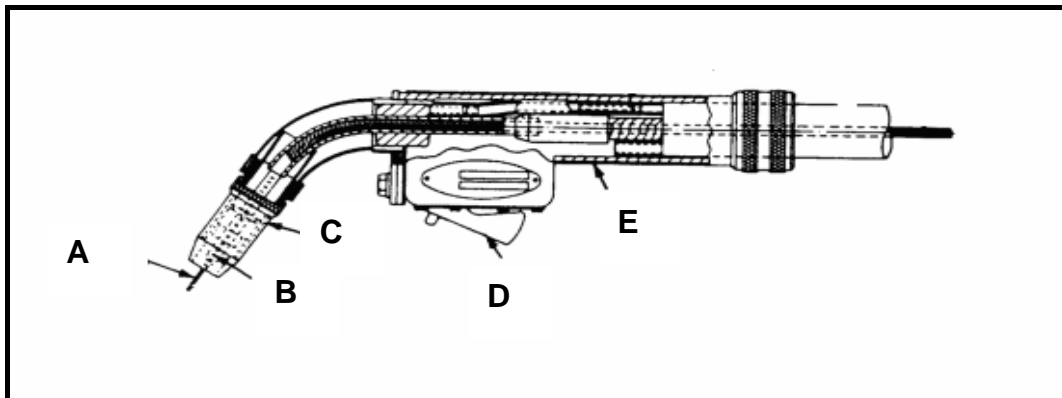
- Upstream reservoir
- Pipe connection to the turbine
- Turbine
- Generator
- Downstream reservoir

(6)
[20]



QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES

4.1 Study the illustration below and answer the questions that follow.



- 4.1.1 What is this device called? (1)
- 4.1.2 Identify the parts labelled **A** to **E**. (5)
- 4.1.3 Describe the composition of the gas that is used in this device and give the function of this gas mixture in the cutting process. (4)
- 4.1.4 In which direction should you work when operating this type of welding apparatus? (2)

4.2 Describe the procedure that should be followed when welding a horizontal square butt weld with the aid of a normal arc-welding machine. (5)

4.3 The picture below shows a safety component used in an oxy-acetylene welding apparatus.



- 4.3.1 Name this device. (1)
- 4.3.2 Briefly describe the function of this device. (2)

4.4 Name THREE advantages of the inverter welding machine over the traditional arc-welding machine. (3)

- 4.5 Welding fixed pipes can cause problems for the welder because the welding plane continuously changes as the welder welds a run. This can be seen clearly in the picture below.



Briefly describe the main problem for the welder when doing this type of welding and name the types of welding this person should be familiar with. (5)

- 4.6 Hard facing is the process where worn parts, for instance the shears of a plough, can be built up by padding with a wear-resistant metal.

4.6.1 Name THREE types of wear that parts of a plough are subjected to when cultivating a field. (3)

4.6.2 Name at least TWO measures that should be taken before hard facing can be done on parts that are subjected to extreme wear. (2)

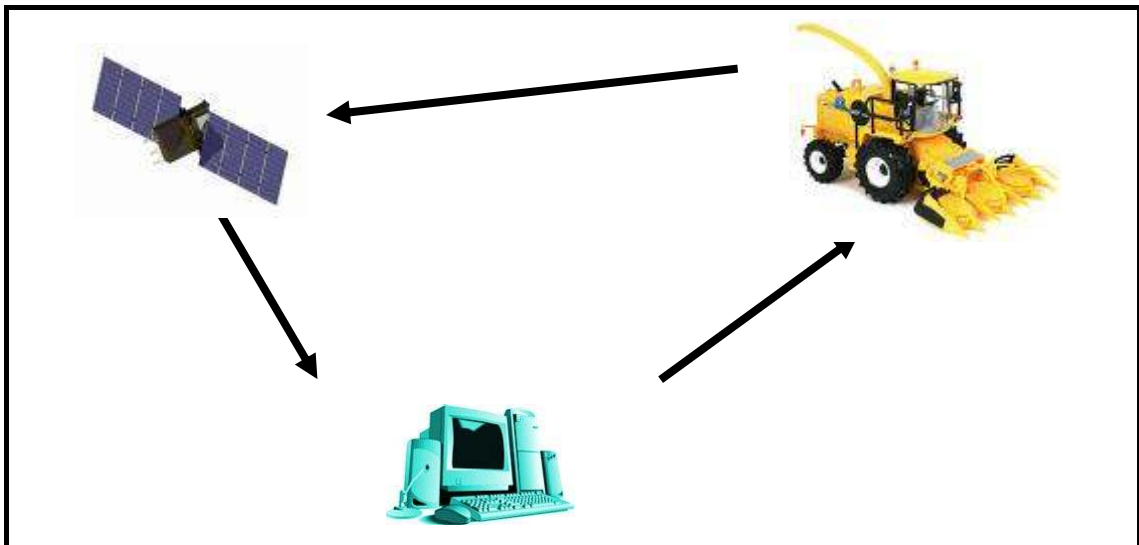
4.6.3 Shrinking should be controlled at all times when welding to prevent the distortion of the parts of the plough that is being welded.

Describe a method to prevent distortion when doing hard facing on the shears of a plough. (2)

[35]

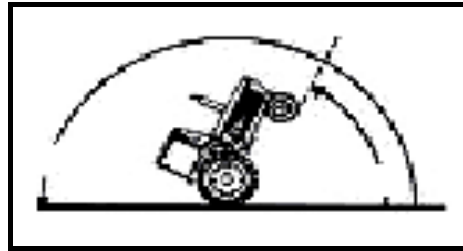
QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT

- 5.1 Explain the concept *mechanisation in agriculture*. (4)
- 5.2 Buying a new tractor is a huge capital expense and needs a careful approach. Name FOUR technical factors that have to be considered before buying a new tractor. (4)
- 5.3 The illustration below shows a combine harvester, satellite and computer. Study the illustration and answer the questions that follow.



- 5.3.1 Name and describe the operation of yield-monitoring devices on advanced agricultural implements. (4)
- 5.3.2 Yield maps that are obtained from the harvester show the farmer where there are yield differences in the field, which can be rectified by applying fertilisers to the specific areas. (2)
- Indicate the devices that a farmer can install on the fertiliser equipment to precisely control the rate of fertiliser application throughout the whole field.

5.4 Study the illustration below and answer the questions that follow.

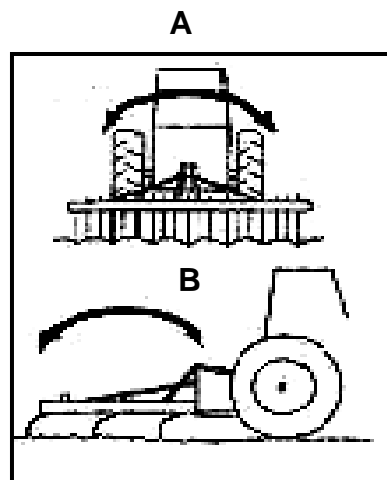


5.4.1 The tractor in the sketch above has a serious problem with mass displacement.

Name TWO ways of changing this tractor's mass displacement positively, preventing it from flipping backwards. (2)

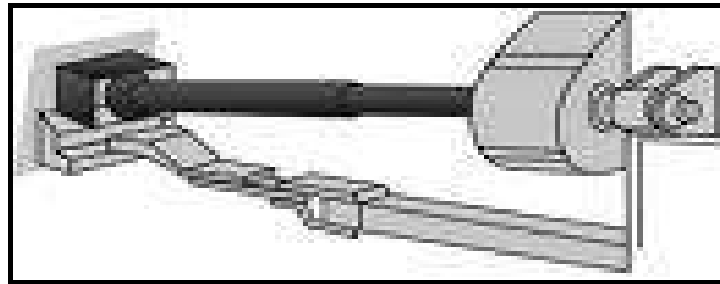
5.4.2 Name ONE safety device that must always be installed on a tractor to safeguard the operator if it should flip backwards. (1)

5.5 The implements that are hitched to the tractor in the sketch below have to be set as the arrows indicate.



Name the devices installed on a tractor that are used to do the settings as shown in the sketches above. (2)

5.6 Safety screens installed on a baling machine, such as the one shown in the sketch below, must adhere to certain requirements.



State THREE requirements for installing safety screens. (3)

5.7 The pictures below show two types of baling machines used on a farm.



5.7.1 Compare, in table form, FIVE disadvantages of the Ram/rectangular baler with that of the round baler. (10)

5.7.2 The timing of a Ram-type baler is very important. Explain the meaning of this concept. (2)

5.8 The picture below shows hydraulic cylinders attached to an implement.



5.8.1 Briefly discuss the operation of the double-action hydraulic cylinder used on farm implements. (4)

5.8.2 Name TWO advantages of the use of transmission oil in tractor hydraulic systems. (2)

[40]

QUESTION 6: WATER MANAGEMENT

6.1 Answer the following questions on water scheduling:

6.1.1 Define the term *irrigation scheduling*. (2)

6.1.2 Briefly explain the advantages of irrigation scheduling to a farmer. (3)

6.2 Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A – H) next to the question number (6.2.1 – 6.2.5) in the ANSWER BOOK, for example 6.2.6 K.

COLUMN A	COLUMN B
6.2.1 A lateral drain runs into the main drain at about 45°	A natural system
6.2.2 An object used to prevent rodents from entering the drain	B plug
6.2.3 A system of parallel pipes used on level soil	C fish-bone drain
6.2.4 This system can be used on an irregular wet area	D open drain
6.2.5 This is used to prevent soil from clogging pipes	E sieve
	F stone drain
	G covering material
	H grid iron

(5 x 1) (5)

6.3 Farm animals depend on humans for their water requirements.

6.3.1 Name a type of pipe the farmer can use to supply water to farm animals. (1)

6.3.2 Explain why the farmer would prefer to use the above-mentioned pipe. (5)

6.4 Give the correct term for each of the following components used in water supply systems:

6.4.1 A short piece of piping with outside thread at both ends (1)

6.4.2 A short piece of piping with threads on the inside (1)

6.4.3 An object used to close the end of a pipe (1)

6.5 Briefly explain why bleach should never be used in a septic tank. (2)



- 6.6 Study the picture below in connection with water provision on a farm and answer the questions that follow.



- 6.6.1 Water provision to farm animals must be efficient because animals can only survive for short periods without water.

Name the requirements that should be kept in mind by the farmer when building a functional reservoir for animals.

(4)

- 6.6.2 The farmer pumps water from a borehole to a drinking trough.

Briefly describe the factors which the farmer should keep in mind when installing drinking water for animals.

(5)
[30]

TOTAL SECTION B: 160
GRAND TOTAL: 200

ANSWER SHEET**CENTRE NUMBER:**

--	--	--	--	--	--	--	--

EXAMINATION NUMBER:

--	--	--	--	--	--	--	--	--	--	--	--	--	--

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:**

--





basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL TECHNOLOGY

NOVEMBER 2010

MEMORANDUM

MARKS: 200

This memorandum consists of 11 pages.

SECTION A**QUESTION 1**

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

TOTAL SECTION A: 40

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

- 2.1 2.1.1 • Fences shall be installed and operated so that they cause no electrical hazard to persons, animals or the environment. ✓
 • Electric fence constructions, which are likely to lead to entanglement of animals or persons, shall be avoided. ✓
 • An electric fence shall not be supplied from more than one energiser. ✓
 • Barbed or razor wire shall not be electrified by an energiser. ✓
 • Any part of an electric fence which is installed along a public path or highway shall be identified by **warning plates/signs**. ✓
 • The energiser earth electrode shall penetrate the ground to a depth of at least 1 metre.
 • Connecting leads that are run underground shall be run in a conduit of insulating material.
 • Connecting leads shall not be installed in the same conduit as the mains supply wiring, communication cables or data cables.
 • Connecting leads and electric fence wires shall not cross above overhead power or communication lines.
 • Crossings with overhead cables shall be avoided wherever possible. If such a crossing cannot be avoided, it shall be made underneath the power line and as nearly as possible at right angles to it. (Any 5) (5)
- 2.1.2 • Securely fastened to the fence posts or firmly clamped to the fence. ✓
 • Sign must be attached at intervals approximately 10 metres to 50 metres, but not exceeding 90 metres.(visible) ✓
 • The warning signs should be at least 100 mm x 200 mm. ✓
 • The background colour of both sides should be yellow. ✓
 • The inscription shall be black and should be the substance of **TAKE CARE – ELECTRIC FENCE**.
 • The inscription should be indelible, inscribed on both sides and have a height of at least 25 mm.
 • Use the local language of the area
 • High enough for theft/
 • Must be big enough/colourful
 • Vandalism /Out of reach of children (Any 4) (4)
- 2.1.3 • Bad joints. ✓
 • Live wires touching the earth. ✓
 • Improper insulation. ✓
 • Vegetation/Animals/Humans touching the fence. (Any 3) (3)

NSC – Memorandum

2.1.4 Volume = Length x width x height ✓
 = 500 x 500 x 900(0.5x0.5x0.9)✓
 = 225 000 000 mm³(0.225)✓
 = 225 000 000 ÷ 1000 000 000✓
 = 0,225 m³✓

Or Volume = Length x width x height ✓
 = (0.5x0.5x0.9)✓ ✓
 = 0,225 m³✓ ✓ (5)

- 2.1.5 • By installing a lightning arrestor in the circuit of the electrical fence.✓
 • Damage can be prevented by disconnecting the energiser from the fence line and disconnecting it from the power supply during electrical storms. ✓ (2)

- 2.2 2.2.1 • The triangular shape is sturdy, strong✓
 • Is resistant to distortion through strong winds. ✓
 • Round shape prevents hail and water damage
 • The aerodynamic half round shape causes wind to deflect over the structure and not against it. **(any two)** (2)

- 2.2.2 • Strong ✓
 • Light must penetrate the covering/translucent. ✓
 • Keep insects and pests out. ✓
 • Keep rainwater out. ✓
 • Must be resistant to sun/heat, frost/snow, strong wind and hail.
 • Not too expensive.
 • No need to be replaced regularly/durable. (Any 4) (4)

- 2.2.3 • Make sure that the plastic covering draws tightly around the structure. Loose plastic is torn easily by the wind. ✓
 • Repair tears immediately. ✓
 • Paint all metal parts on a regular basis to prevent rusting. ✓ (3)
 (Any valid reason that will damage the structure)

- 2.3 • Catalyst and accelerator should always be stored separately. (Explosion) ✓
 • Remove all resin, catalyst and accelerator from skin. ✓
 • Wear gloves if skin is sensitive. ✓
 • Use acetone only in a well-ventilated area.
 • Handle resin casting carefully as they are brittle.
 • Prevent small pieces of fibre from penetrating the skin.
 • Do not breathe in glass fibre or get it in your eyes. (Any acceptable answer will be accepted as correct) (Any 3) (3)

- 2.4
- Good weldability ✓
 - Corrosion resistant (not rust easy)✓
 - Very durable
 - For hygienic reasons (milk tanks and equipment etc.)
(Any acceptable answer will be accepted as correct)
- (2)
(Any 2)
- 2.5
- Increases resistance against corrosion✓
 - Promotes the hardening of steel ✓
 - Improves strength
 - Improves resistance to the formation of scale
 - Improves tensile strength
 - Decreases magnetism
 - Most chromium steels can be welded well.
- (Any 2) (2)
[35]

QUESTION 3: ENERGY

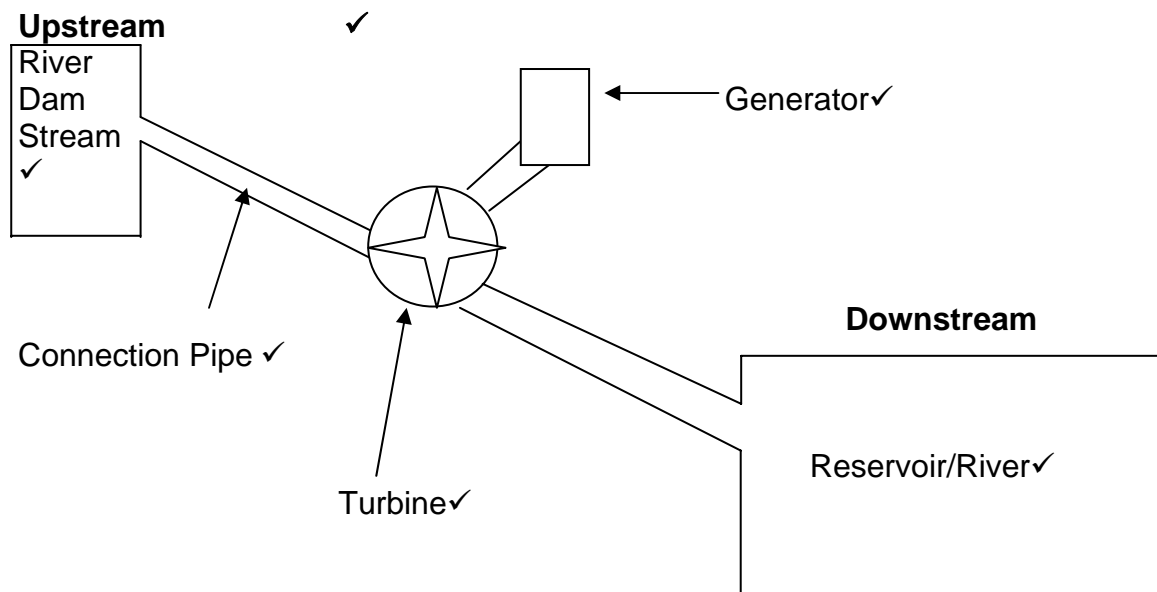
- 3.1 3.1.1
- The device shown in the picture is called a wind turbine. ✓
 - Is used where no electricity is available or as an alternative energy source. ✓
 - Wind turns the blades of the device. ✓
 - The turning blades turn a generator. ✓
 - This generator generates direct current electricity that cannot be utilised in an ordinary farming enterprise for electrical machines and equipment.
 - The direct current is then changed to alternating current that can be used on the farm, with the aid of an inverter.
 - The DC energy produced can be stored in batteries for standby electricity during windless periods.
- (Any 4) (4)
- 3.1.2
- Prevailing winds that are not strong enough or not constant enough. ✓
 - Large trees or obstacles nearby that divert the prevailing winds from the turbine. ✓
 - Inadequate maintenance. ✓
 - Strong winds during storms can destroy the structure if preventative measures are not in place.
- (Any 3) (3)
- 3.1.3
- Release the pressure on the country's fossil fuel resources.✓
 - Reduce pollution. ✓
 - Cheap energy source. ✓
 - Lesser oil imports for the country.
- (Any 3) (3)
- 3.2 3.2.1
- Geothermal-/heat-/kinetic(movement-)convection energy. ✓ (1)
- 3.2.2
- **Heat from the earth's** inner core where there is lava and it is very hot. ✓ (1)
- 3.2.3
- Geothermal vents are not readily accessible. ✓
 - Preliminary cost is high. ✓

- Cannot be utilised efficiently on a small scale. (Any 2) (2)

3.3 **Allocation of marks:**
Sketch itself (ONE mark)

The following items must appear in the drawing with their labels:

Upstream reservoir
Pipe connection to the turbine
Turbine
Generator
Downstream reservoir



(Any design is acceptable, as long as the six main components are included)

(6)
[20]

QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES

- 4.1 4.1.1 MIG/MAG/CO₂ welding gun or gas metal arc-welding gun. ✓ (1)
- 4.1.2 A Welding electrode/filler wire ✓
B Current contact tube ✓
C Nozzle ✓
D Gun switch ✓
E Gun handle ✓ (5)
- 4.1.3 **Composition:** Argon, ✓ helium ✓ and carbon dioxide (CO₂). ✓
The function: Is to serve as a shield to protect the weld from pollution from the surrounding atmosphere. ✓ (4)
- 4.1.4 Push/Draw in any direction of travel ✓ with a 70° to 80° angle to the work piece. ✓ (2)

- 4.2
- Tack the prepared work pieces together. ✓
 - Lean the electrode in the direction of travel and point it slightly upwards. ✓
 - Strike an arc and run a bead along the joint. ✓
 - If the force of the arc tends to undercut the work piece at the top of the bead, shorten the arc length and increase the upward angle of the electrode until a normal bead is formed. ✓
 - If necessary, lower the amperage to give better control of the flow of metal. ✓
 - After completion chip off the slag and inspect the bead. (5)
- 4.3
- 4.3.1 Flashback arrestor. ✓ (1)
- 4.3.2 Prevent flames from jumping back from the welding nozzle into the pipe, ✓ causing the gas bottles to explode. ✓ (2)
- 4.4
- It is more compact. ✓
 - It is much lighter in construction. ✓
 - Use less current (economical). ✓ (3)
 - Lower ampere
 - Much safer to use
 - Can do tack welding
- (Any Three)**
- 4.5
- The welding plane continues to change because of the round structure of the pipes. ✓
 - The welder starts with upwards welding ✓
 - Underhand welding ✓ (5)
 - Downwards welding ✓
 - Overhead welding. ✓
- 4.6
- 4.6.1
- Metal against metal friction ✓
 - Serious jolts or shocks of metal against rock ✓
 - Scraping, jolts and shocks ✓
 - Serious scraping (3)
- (Any 3)
- 4.6.2
- Area to be covered must be free of corrosion, grease, oil or other foreign substances ✓
 - By grinding or filing it away. ✓ (2)
- 4.6.3 Welding of patchwork or clamping the parts to a stable surface ✓ and preventing the part to overheat. ✓ (2)
- [35]**

QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT

- 5.1
- Provides technology ✓
 - Advancement to agriculture ✓
 - Above the use of animal-drawn implements ✓
 - To increase productivity, quality and yield. ✓
 - To help the farmer to produce better, quicker, cheaper and more effectively. (Any 4) (4)
- 5.2
- Driving power.(Kw) ✓
 - Local availability of parts and service. ✓
 - Rigidity of construction. ✓
 - Simplicity of control mechanisms. ✓
 - Driver comfort.
 - Versatility. (Two wheel or four wheel drive)
 - Proven reliability and durability. (Any 4) (4)
- 5.3
- 5.3.1
- The yield data from the monitor is recorded and stored at regular intervals along with positional data received from the GPS unit. ✓
 - GIS software ✓
 - Yield monitors are crop yield measuring devices installed on harvesting equipment. ✓
 - Takes the yield data and produces yield maps. ✓
- 5.3.2
- Farm equipment equipped with variable rate technology ('VRT') ✓ along with GPS ✓ and monitors. (2)
- 5.4
- 5.4.1
- Decreasing the tow bar pulling force. ✓
 - Lowering the tow bar. ✓
 - Increase the wheel base of the tractor.
 - Placing weights on the front part of the tractor. (Any 2) (2)
- 5.4.2
- Roll bar/cage. ✓ (1)
- 5.5
- A Levelling box ✓
- B Top link ✓ (2)
- 5.6
- Appearance should be neat. ✓
 - Safeguard the equipment/operator. ✓
 - Removed and replaced easily. ✓
 - Do not become loose.
 - Weight saving.
 - Keep out all undesired matter. (Any 3) (3)

- 5.7 5.7.1 **RAM Baler (rectangular)**
- Higher labour needs for handling bales. ✓
 - Bales must be stored under cover. ✓
 - Higher maintenance requirements. ✓
 - Working more complicated. ✓
 - Higher repair requirements. ✓
- Roller Baler (round)**
- Bales not easily transported. ✓
- Bales must be handled mechanically. ✓
- No automatic packing machine for bales. ✓
- Relatively vast storage area required for bales. ✓
- Use of bales for feeding problematic. ✓
- (10)
- (Any FIVE disadvantages can be correct for 2 marks each)
- 5.7.2 Timing is the exact moment when the needles lift the binding rope ✓ so that the compressed hay can be bound. ✓ (2)
- 5.8 5.8.1
- When the control lever is in neutral position, the oil is pumped to the control valve and back to the oil container via the oil filter. ✓
 - The moment the control lever is shifted to the lift position, the control valve directs the pressurised oil to the piston end of the hydraulic cylinder causing the piston to move to the right, and the implement is lifted. ✓
 - In order to force the implement into the soil, the operator moves the control lever to the 'lower' position and now the control valve will direct the pressurised oil along the second pipe into the shaft-end of the cylinder causing the piston to move to the left. ✓
 - In this way, the operator controls the implement positively in two directions. ✓
- (4)
- 5.8.2
- Not compressible. ✓
 - Good lubrication qualities. ✓
 - Remains liquid over a large temperature range.
 - Not volatile.
 - Relatively cheap.
 - Easily conductible in pipes.
 - Flows through filters, pipes, oil pumps and cylinders with ease.
 - Contains detergents that keep parts clean. (Any 2)
- (2)
- [40]**

QUESTION 6: WATER MANAGEMENT

- 6.1 6.1.1 • The process to determine the correct frequency and duration of water application ✓✓ (2)
- 6.1.2 • To save water ✓
 • To prevent overirrigation ✓
 • To prevent underirrigation ✓
 • To apply enough water to fully wet the plant's root zone
 • To allow the soil to dry out in between water applications
 • To allow air to enter the soil (aeration of the soil) (Any 3) (3)
 • To prevent leaching of nutrients
- 6.2 6.2.1 C ✓
 6.2.2 E/H ✓
 6.2.3 H ✓
 6.2.4 A ✓
 6.2.5 G ✓ (5)
- 6.3 6.3.1 • Galvanised pipes or plastic pipes (PVC) ✓ (1)
- 6.3.2 **Galvanised pipes:**
 • Long lifespan ✓
 • Cannot be constricted by roots ✓
 • Robust ✓
 • Need no paint ✓
 • Cannot be damaged by digging ✓
 • Easily joined
 • Resist high pressure
- OR
- 6.3.2 **Plastic pipes:**
 • Light and easy to handle
 • Few joints necessary
 • Long lengths laid in short time
 • Lay easily around sharp bends
 • Cuts and joins with ease
 • Relatively cheap (5)
- 6.4 6.4.1 Nipple/Male joint piece ✓ (1)
- 6.4.2 Socket/Female joint piece ✓ (1)
- 6.4.3 Plug ✓ (1)

- 6.5 • Bleach would kill the bacteria ✓that are responsible for breaking down the sewage in a septic tank. ✓ (2)
- 6.6 6.6.1 • Foundation of the reservoir must be strong to prevent cracks in the dam. ✓
 • Foundation must be well compacted to prevent sagging. ✓
 • Reinforcement must be build into the foundation and the walls of the dam. ✓
 • Dam must be higher than the trough to ensure a steady flow of water. ✓
 • Capacity of the reservoir must be efficient if two or more camps or troughs are served.
 • Pipes to the troughs must be big enough to satisfy the needs of the animals.
 • Is there a reliable water source nearby?
 • Is it central to all seeping?
 • Planning of the overflow.
 • Safety to animals.
 • Cost of dam.
 • Open /close reservoir. (Any 4) (4)
- 6.6.2 • The pressure should be high enough to satisfy needs. ✓
 • Prevent spillage. ✓
 • Joints must be watertight. ✓
 • Spillage water should be able to drain away from the drinking area. ✓
 • All valves/pipes should be protected. ✓
 • Distance from the resource
 • Capacity of the trough
 • Needs of different types of animals
 • Safety to animals (Any 5) (5)
- [30]**
- TOTAL SECTION B: 160**
GRAND TOTAL: 200