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basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS

AGRICULTURAL TECHNOLOGY

2018

MARKS: 200

TIME: 3 hours

This question paper consists of 16 pages.

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.
 - 1.3 Answer ALL the questions in the ANSWER BOOK.
 - 1.4 Number the answers correctly according to the numbering system used in this question paper.
 - 1.5 You may use a non-programmable calculator.
 - 1.6 Write neatly and legibly.
2. SECTION A: SHORT QUESTIONS
 - 2.1 This section consists of THREE questions.
 - 2.2 Follow the instructions when answering the questions.
3. SECTION B: STRUCTURED LONG QUESTIONS
 - 3.1 This section consists of FIVE questions.
 - 3.2 Start EACH question on a NEW page.

SECTION A**QUESTION 1**

- 1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.

- 1.1.1 The ... is used to remove welding spatter from metal.
- A prick punch
 - B rasp
 - C angle grinder
 - D hack saw
- 1.1.2 The ... is used to remove a bearing from an alternator shaft without damaging the components.
- A acetylene flame
 - B claw hammer
 - C bearing chisel
 - D bearing puller
- 1.1.3 The ideal number of teeth per 25 mm on a hacksaw blade used to cut 20 mm solid aluminium bar:
- A 6 teeth per 25 mm
 - B 18 teeth per 25 mm
 - C 52 teeth per 25 mm
 - D 62 teeth per 25 mm
- 1.1.4 ... is used for the manufacturing of O rings.
- A Fibreglass
 - B Teflon
 - C Perspex
 - D Bakelite
- 1.1.5 This material should NOT be grinded with a bench grinder because the material clogs the grinding wheel pores causing the wheel to overheat:
- A Cast iron
 - B Mild steel
 - C Copper
 - D Stainless steel

- 1.1.6 The use of compressed air in the farm workshop is associated with ...
- A soldering.
 - B MIG welding.
 - C TIG welding.
 - D plasma cutting.
- 1.1.7 Incorrect calibration of a diesel pump on a tractor can be identified by ...
- A black smoke exiting the exhaust.
 - B noisy valves.
 - C white smoke exiting the exhaust.
 - D the engine that back-fires.
- 1.1.8 Modern technological systems, such as ..., are used to notify the operator when grain is blocking the system in a combine harvester.
- A yield monitors
 - B flow sensors
 - C neutron probes
 - D tensiometers
- 1.1.9 The drain pipe connecting the toilet to the septic tank is made from ...
- A copper.
 - B latex.
 - C PVC.
 - D iron.
- 1.1.10 The most suitable all-purpose fire extinguisher for a welding workshop:
- A Foam extinguisher
 - B Water hose
 - C Water extinguisher
 - D Dry powder extinguisher
- (10 x 2) (20)

1.2 Change the UNDERLINED word(s) in each of the following statements to make the statements TRUE. Write only the word(s) next to the question numbers (1.2.1 to 1.2.5) in the ANSWER BOOK, e.g. 1.2.6 Tractor.

1.2.1 Safety signs attached to an electric fence must be made of plastic with a red background.

1.2.2 A newspaper is the most effective type of communication to inform farm neighbours about an immediate emergency.

1.2.3 A one-way valve is a device that is capable of adjusting the water delivering time in response to current environmental conditions.

1.2.4 Compressed air is used as a hydraulic fluid in a car's bottle jack.

1.2.5 Steel that has a copper coating produces poisonous gases when subjected to welding. (5 x 2) (10)

1.3 Choose a word/term from COLUMN B that matches the description in COLUMN A. Write down only the letter (A–H) next to the question numbers (1.3.1 to 1.3.5) in the ANSWER BOOK, e.g. 1.3.6 I.

COLUMN A		COLUMN B	
1.3.1	Alloy elements used in the manufacturing of stainless steel	A	porosity
1.3.2	A heat-resistant plastic	B	argon
1.3.3	The MIG welding defect that occurs when the gap between the nozzle and the work piece is excessive	C	cracking
1.3.4	The gas with the highest cutting capacity used for plasma cutting	D	chromium and nickel
1.3.5	A highly flammable gas that is commonly used in the workshop	E	acetylene
		F	copper and zinc
		G	bakelite
		H	Perspex

(5 x 2) (10)

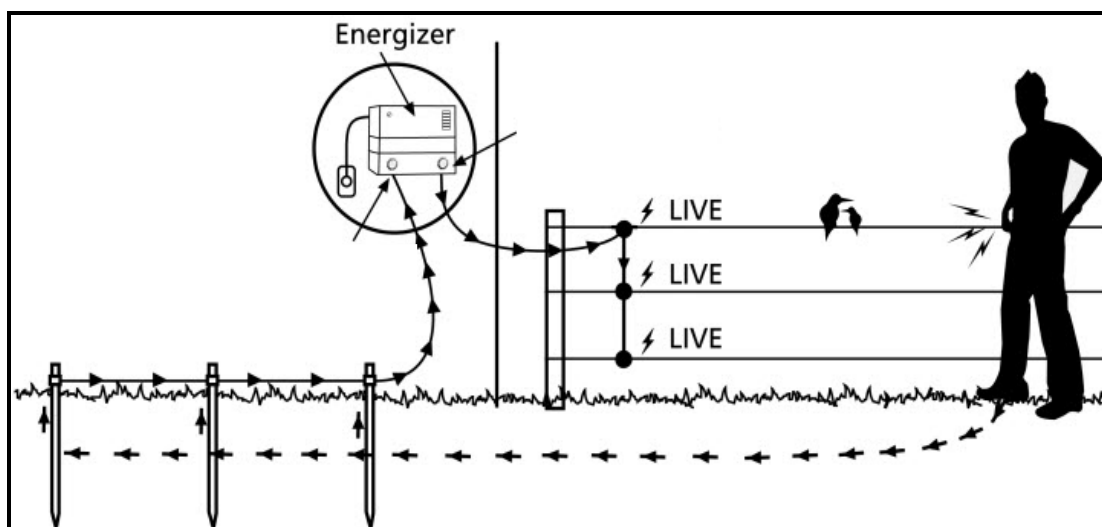
TOTAL SECTION A: 40

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

(Start this question on a NEW page.)

- 2.1 Indicate the alloy metal that is specifically used to manufacture the following products and give TWO reasons why the metal is used:
- 2.1.1 Milk tanks (3)
 - 2.1.2 Fittings for hot-water copper pipes (3)
 - 2.1.3 Hammering tools that can be used in explosive atmospheres (3)
- 2.2 Name TWO hot-working processes that can be used to change the structural properties of brass. (2)
- 2.3 Concrete and fibreglass drinking troughs are used to provide water to farm animals.
- 2.3.1 Give TWO reasons why farmers would prefer fibreglass troughs instead of concrete troughs for cattle. (2)
 - 2.3.2 Describe the *resin* that is used to manufacture fibreglass products. (2)
 - 2.3.3 Name TWO methods that can be used to join fibreglass parts. (2)
- 2.4 Give FIVE reasons why Vesconite is the best material for the manufacturing of bushes. (5)
- 2.5 Describe how an adhesive should be applied to a surface to ensure sufficient cohesion. (4)

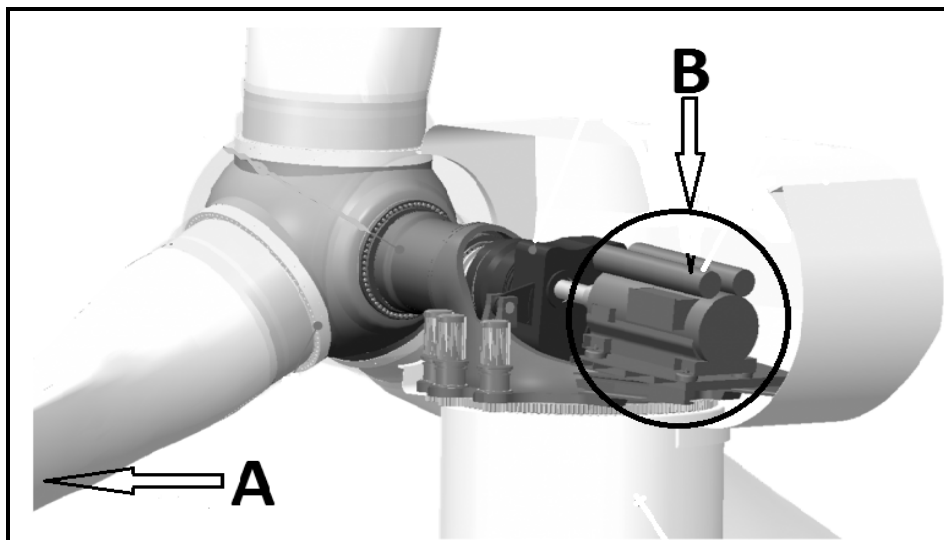
- 2.6 An earth return system, as shown in the illustration below, is needed for the electric fence to function effectively.



- 2.6.1 Briefly discuss the procedure that must be followed when testing the earth system of an electric fence. (4)
- 2.6.2 Give TWO examples where electric fences are used on a farm. (2)
- 2.6.3 Name THREE alternative energy sources that can be used to supply energy to an electrical fence. (3)
- [35]**

QUESTION 3: ENERGY**(Start this question on a NEW page.)**

- 3.1 The sketch below shows parts of a wind turbine. Identify the TWO parts labelled **A** and **B** and describe the function of EACH.



(4)

- 3.2 The solar hot-water system shown below is used to heat water without using electricity.

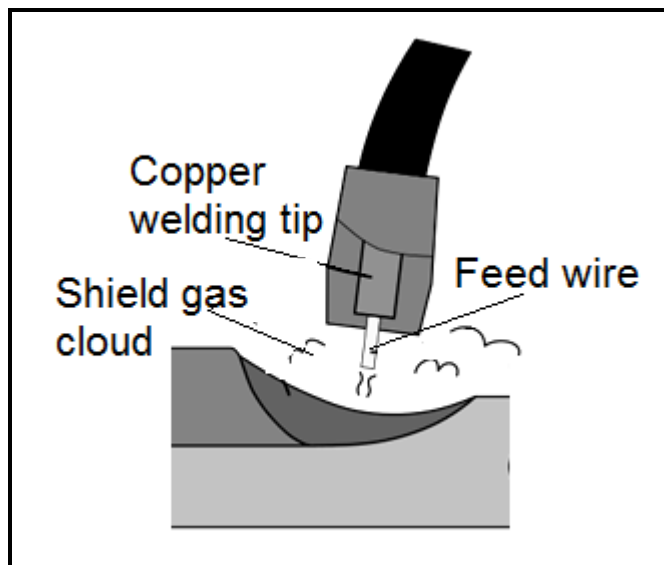


- 3.2.1 Explain the working of the solar hot-water system shown above. (4)
- 3.2.2 Name FOUR benefits of using solar energy to heat water. (4)

- 3.3 A geothermal energy plant is planned for construction in the Northern Cape.
- 3.3.1 State TWO geological aspects that should be considered to determine the location to construct a geothermal energy plant. (2)
- 3.3.2 Describe TWO advantages of a geothermal energy plant. (2)
- 3.4 Bio-energy is widely used as alternative fuel for agricultural machines.
- 3.4.1 Name TWO alternative fuels that can be manufactured from plant material. (2)
- 3.4.2 Name TWO crops that can be used to produce bio-fuel. (2)
- [20]**

QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES**(Start this question on a NEW page.)**

4.1 The illustration below shows the nozzle of a MIG welding apparatus.



4.1.1 Describe the origin and purpose of the shielding gas cloud that forms around the welding area. (3)

4.1.2 Explain the procedure that must be followed when the feed wire burns onto the copper welding tip. (4)

4.1.3 Name TWO circumstances that can cause the feed wire to melt onto the welding tip. (2)

4.1.4 Name THREE causes of cracks forming on the welding bead when performing MIG welding. (3)

4.2 Heat has an influence on the amount of shrinking that occurs in a metal during the welding process.

4.2.1 Describe *shrinking* as it occurs in a welding joint. (3)

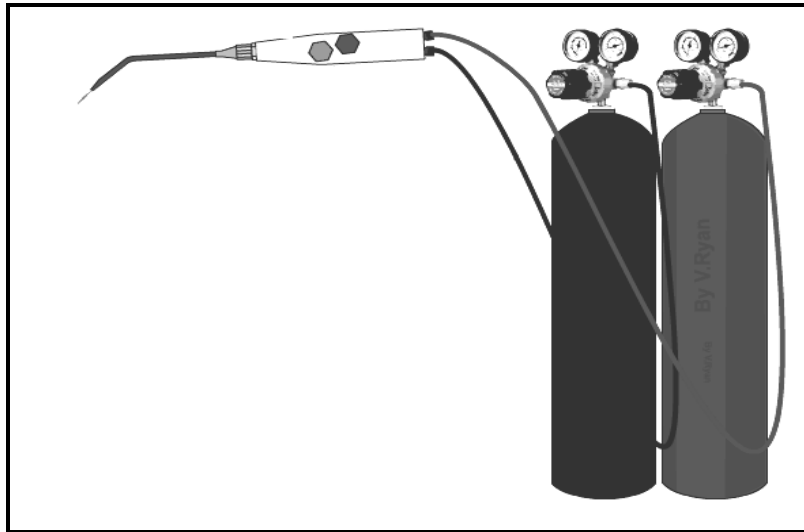
4.2.2 Make a freehand drawing to illustrate longitudinal angular shrinking on a welded project. The dimensions of the two flat bar pieces that must be welded together is 50 mm x 10 mm x 100 mm.

The following must be included on the drawing:

- TWO pieces of metal (1)
- Welding bead (1)
- Longitudinal angular shrinking (1)
- Change in the shape of the metals (1)

4.2.3 State TWO measures that can be taken to prevent metal from distorting when welding is performed. (2)

4.3 The illustration below shows an oxy-acetylene set.



4.3.1 Why is the use of sunglasses not recommended when cutting with the oxy-acetylene set? (2)

4.3.2 Describe the possible outcome for the gas cylinder if it accidentally topples over. (2)

4.3.3 Name TWO types of metal that can be cut with an oxy-acetylene welding set. (2)

4.4 Give technical advice to a farmer who wants to purchase a plasma cutting machine for general use on the farm. (2)

4.5 Name FOUR items of personal protective equipment (PPE) that must be worn when doing plasma cutting. (4)

4.6 State TWO factors that cause poor cutting performance when using the plasma cutting machine. (2)
[35]

QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT**(Start this question on a NEW page.)**

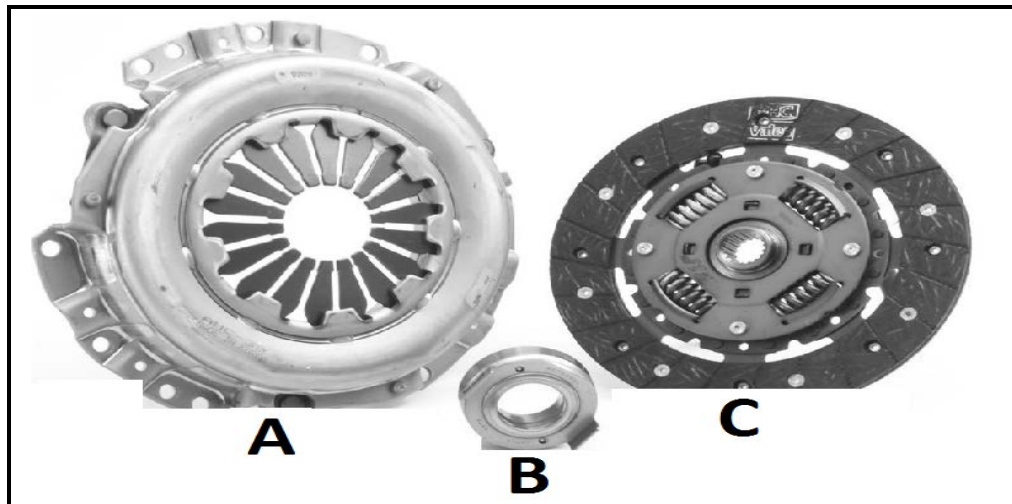
5.1 Specialisation plays a crucial role in the management of a farm to ensure success in the agricultural sector.

5.1.1 Name TWO disadvantages of farm mechanisation. (2)

5.1.2 Give TWO examples of fixed capital on a farm. (2)

5.2 State TWO functions of a shear bolt used in the drive system of a baling machine. (2)

5.3 Label the THREE parts of the clutch assembly, **A**, **B** and **C**, as shown in the photograph below.



5.4 Is it possible for a vehicle to turn around a bend if the differential is locked? Explain the answer. (3)

5.5 Give TWO advantages of using a bearing in a drive system.



5.6 Name TWO benefits of thermoplastic universal joints. (2)

5.7 Make a neat freehand drawing of a ratchet-type slip clutch and indicate the following components.

- Ratchet plate (1)
- Pressure spring (1)
- Driven gear with ratchet plate (1)
- Adjusting nut (1)

5.8 Explain to a tractor operator why it is better to move heavy loads with the rear fork lift rather than with the front fork lift, as shown in the picture below.



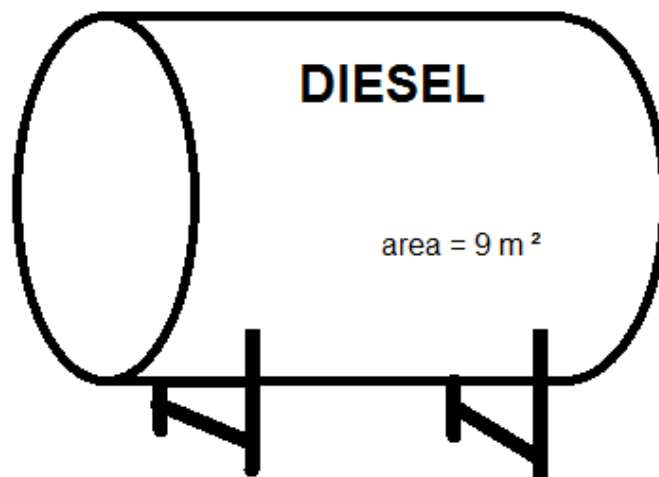
5.9 Describe what happens when the top link between a tractor and a plough is removed when ploughing. (2)

5.10 Name the connection points on the tractor where the quick coupling mechanism shown below should be connected.



- 5.11 Name THREE systems on a combine harvester that must be set or monitored to limit the loss of maize kernels during the harvesting process. (3)
- 5.12 Hammer mills that vibrate will not last long. Name THREE preventative measures that you must implement to keep a hammer mill from vibrating. (3)
- 5.13 Indicate TWO places on a tractor where an automatic depth control mechanism can be installed. (2)
- 5.14 State THREE advantages of using transmission oil in a tractor hydraulic system. (3)
- 5.15 A diesel tank with a surface area of 9 m^2 needs to be painted. Use a corrosion preventative paint with a covering capability of 3 m^2 per litre. TWO coats of paint are required on the tank.

Calculate the amount of paint required. (Show ALL calculations)



(3)
[40]

QUESTION 6: WATER MANAGEMENT**(Start this question on a NEW page.)**

- 6.1 Complete the table below regarding different irrigation systems. Write only the answer next to the question numbers (6.1.1 to 6.1.4).

NAME	EXPLANATION/FUNCTION/WORKING	MATERIAL
6.1.1	Sprinkler irrigation consisting of several segments of pipe joined together and supported by trusses, mounted on wheeled towers with sprinklers positioned along its length. Permanently fixed to a middle point.	Aluminium and galvanised pipes
Hydroponics	A system utilising sprinklers that are permanently installed	6.1.2
Travelling gun sprinkler	6.1.3	Polyethylene tubing and steel drum
6.1.4	A series of pipes, each with a wheel of about 1,5 m diameter. Sprinklers along its length with an engine installed at the middle of the pipe system for driving the system.	Coupled aluminium pipes on steel wheels

- 6.2 State FOUR disadvantages of using a flood irrigation system. (4)
- 6.3 Name the function of EACH of the following parts of an irrigation system:
- 6.3.1 Sand filter (1)
- 6.3.2 Sprinkler (1)
- 6.3.3 Pump (1)
- 6.3.4 Solenoid valve (1)
- 6.3.5 One way valve (1)

6.4 The photographs below show devices used in irrigation scheduling.



A



B

6.4.1 Name devices **A** and **B** above. (2)

6.4.2 What is the main purpose of the devices shown above? (1)

6.5 Name TWO devices that are used to control garden watering systems. (2)

6.6 Describe the operation of a septic tank drainage system. (3)

6.7 Name THREE points to consider when identifying a suitable location for the installation of a septic tank. (3)

6.8 Describe the operation of a pipe drainage system. (3)

6.9 Name THREE types of water purification systems that use a membrane to purify household water. (3)

[30]

TOTAL SECTION B: 160
GRAND TOTAL: 200