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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

AGRICULTURAL TECHNOLOGY

NOVEMBER 2012

MARKS: 200

TIME: 3 hours

This question paper consists of 12 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 Non-programmable calculators may be used.

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	☒ A	B	C
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- 1.1 Pesticide spraying equipment uses ... substances and must be used with extreme care and under supervision.
- A sticky
B hazardous
C slippery (2)
- 1.2 ..., as a result of exposure to the noise of equipment, is a state of health that can be permanent.
- A A lung disease
B A back problem
C Hearing loss (2)
- 1.3 Minor cuts and scrapes suffered in the workshop must be ... by the teacher.
- A disinfected and left alone
B disinfected
C left alone (2)
- 1.4 This type of fire should be tackled with dry powder or CO₂ extinguishers after disconnecting the ...
- A electricity supply.
B water supply.
C foam supply. (2)
- 1.5 The incorrect use and disposal of agricultural chemicals ...
- A can cause respiratory diseases and injuries.
B can cause cancer in humans and animals.
C Both A and B (2)
- 1.6 Stainless steel can be produced by melting chrome, manganese and ... together.
- A mild steel
B nickel
C copper (2)

- 1.7 The function of the ... in a vehicle is to ensure that the gears can be changed while the vehicle is moving.
- A differential
 - B clutch
 - C gearbox
- (2)
- 1.8 Mild-steel sheets are often galvanised to prevent them from ...
- A getting too hot.
 - B rusting.
 - C getting too cold.
- (2)
- 1.9 ... is a plastic that is extremely heat resistant.
- A Bakelite
 - B Perspex
 - C Teflon
- (2)
- 1.10 The catalyst and ... can have an influence on the speed of the hardening process of adhesives.
- A cohesion force
 - B accelerator
 - C adhesion force
- (2)
- 1.11 To improve the cohesion properties of an adhesive one can ...
- A apply water to the surface before the adhesive is applied.
 - B apply adhesive to both surfaces.
 - C warm up the surface before applying the adhesive.
- (2)
- 1.12 Resin is a fluid with low viscosity that can be transformed into a tough, flexible solid by adding a ... agent.
- A glue
 - B hardening
 - C silicon
- (2)
- 1.13 The size of a normal foundation, as stipulated in the code for building, is ...
- A 600 mm × 230 mm.
 - B 800 mm × 600 mm.
 - C 400 mm × 200 mm.
- (2)
- 1.14 Press wood is not a suitable material for the manufacturing of roof trusses because it ...
- A is too brittle.
 - B deteriorates in moist conditions.
 - C Both A and B
- (2)

- 1.15 Triangular constructions are used in the design of roofs because they strengthen the construction so that the ... can carry the weight of the roof.
- A trusses
 - B beams
 - C purlins
- (2)
- 1.16 The warning signs on all electric fences should be at least ... in size.
- A 100 mm × 200 mm
 - B 900 mm × 800 mm
 - C 100 mm × 100 mm
- (2)
- 1.17 To prevent the driver of a tractor from inhaling exhaust gases the
- A manifold of the tractor may be enlarged.
 - B exhaust of the tractor may be lengthened.
 - C exhaust of the tractor may be shortened.
- (2)
- 1.18 To prevent loose soil and stones from falling into a borehole, the borehole should be ...
- A drilled.
 - B lined.
 - C plastered.
- (2)
- 1.19 The gas that provides the flame when using the oxy-acetylene welding process is ...
- A argon gas.
 - B oxygen.
 - C acetylene gas.
- (2)
- 1.20 Which ONE of the following is NOT an advantage of a combine harvesting machine?
- A It is a time- and labour-saving machine.
 - B It requires a large financial input.
 - C Accurate record-keeping is possible.
- (2)

TOTAL SECTION A: 40

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

- 2.1 Name THREE methods, besides tinning, that can be used to protect metals against the elements of nature. (3)
- 2.2 Discuss any FIVE characteristics of adhesives. (10)
- 2.3 Explain the functions of bracing in the roof construction of a building on the farm. (3)
- 2.4 Name any type of insulation material that can be used between the roof and the ceiling to keep a shed cool in summer and warm in winter. (1)
- 2.5 Large structures place extreme stress on their foundations with the result that some foundations tend to crack because of the weight.
- 2.5.1 Describe any TWO methods of strengthening these foundations. (4)
- 2.5.2 Name THREE basic requirements of the foundation if the structure is built on sandy soil. (3)
- 2.6 Give a valid reason for each of the following statements:
- 2.6.1 Clear fibre-glass roof plates are used on the roof of a greenhouse. (1)
- 2.6.2 An effective game farm fence must be 2,4 metres high. (1)
- 2.6.3 The wires in a fence must not be tensioned too much on a hot day. (1)
- 2.6.4 The best shape that can be used for the construction of tunnels is a half-round shape. (1)
- 2.6.5 Exposed water pipes tend to freeze during winter and are therefore insulated. (1)
- 2.7 State FOUR uses of galvanised steel sheets. (4)
- 2.8 Name TWO methods to cure concrete. (2)

[35]

QUESTION 3: ENERGY

- 3.1 Choose a word from COLUMN B that matches the description in COLUMN A. Write only the word next to the question number (3.1.1–3.1.5), for example 3.1.6 Petroleum.

COLUMN A		COLUMN B
3.1.1	An alcohol biofuel used in racing cars	biodiesel
3.1.2	Gas from earth gas or landfills	petroleum
3.1.3	Fermenting and then distilling starch and sugar crops	methane
3.1.4	Made from crude oil	ethanol
3.1.5	Transesterification of fatty acids	methanol

(5 x 1)

(5)

- 3.2 Electricity in any form is very dangerous. To reduce the risk of a fatal electrical shock one has to be very careful and must adhere to all safety regulations that are applicable to electrical equipment.

Name FOUR dangerous situations leading to workers being shocked by electricity.

(4)

- 3.3 Explain the process of effectively transforming wind energy into a form of electrical power.

(6)

- 3.4 Briefly describe the concept *biofuel*.

(2)

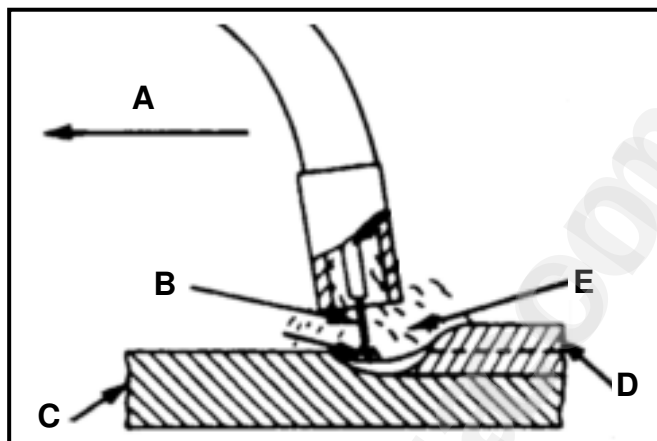
- 3.5 State THREE advantages of biofuel.

(3)

[20]

QUESTION 4: SKILLS AND CONSTRUCTION PROCESSES

- 4.1 The sketch below shows a MIG welding process. Study it and answer the questions that follow.



4.1.1 Identify parts **A** to **E**. (5)

4.1.2 What does the abbreviation *MIG* stand for? (3)

4.1.3 State FIVE advantages of MIG welding. (5)

- 4.2 The picture below shows an inverter welder that is used on a farm for general welding purposes.



4.2.1 Name the type of current produced by the welding machine above. (1)

4.2.2 Give FIVE reasons why a farmer should consider buying an inverter welder. (5)

4.2.3 Is it possible to weld aluminium with the inverter welder? Motivate your answer. (2)

- 4.3 Make a neat, labelled sketch of the forehand welding technique when welding with an oxy-acetylene welding apparatus.

Marks will be awarded for:

Labels 5
Sketch 2
Neatness 1

(8)

- 4.4 Describe the term *shrinking* of welding joints.

(4)

- 4.5 Explain the process of *hard facing* of worn metal parts.

(2)

[35]

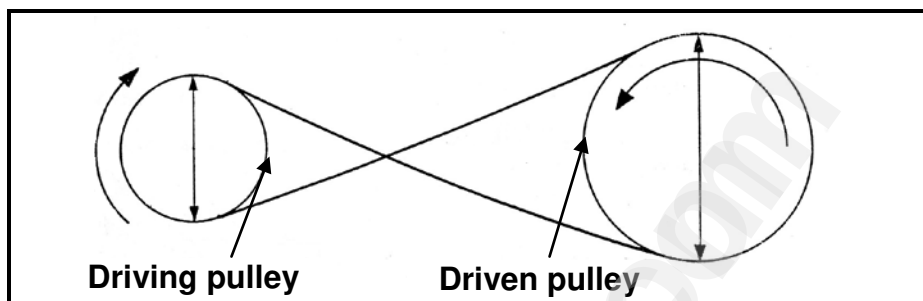
QUESTION 5: TOOLS, IMPLEMENTS AND EQUIPMENT

- 5.1 The picture below shows a power take-off (PTO) shaft that is used as a drive link between the tractor and the implement.



- 5.1.1 Name the device that enables the power take-off shaft to operate at an angle. (1)
- 5.1.2 State the function of the grease nipple installed on this device. (1)
- 5.1.3 The power take-off shaft must always be screened off to prevent it from injuring people. Name TWO requirements of these screens. (2)
- 5.2 When a baler is stored in the off season there are important procedures that must be followed. Name any FIVE procedures. (5)
- 5.3 Gearboxes are used in vehicles to make it possible to select the correct gear ratio for the job that must be done.
- 5.3.1 Name THREE different types of gearboxes that can be used in a vehicle. (3)
- 5.3.2 What is the disadvantage of straight-cut gears? (1)

- 5.4 A farmer wants to pump water from a river with an electrical motor and a centrifugal pump. The diameter of the pulley on the motor is 200 mm and the r/min is 1 500. The speed of the centrifugal pump, as indicated on the manufacturer's label, is 3 000 r/min.



- 5.4.1 Calculate the diameter of the pulley on the pump for optimal efficiency.

Use the following formula:

$$N_a \times D_a = N_g \times D_g$$

Show ALL calculations.

(3)

- 5.4.2 The drive between the motor and the pump in the sketch above is brought about by V-belts. Describe TWO advantages of V-belts.

(2)

- 5.4.3 Give a reason for crossing the belt as indicated in the above sketch.

(1)

- 5.5 Buying a new tractor is a very costly undertaking for a farmer.

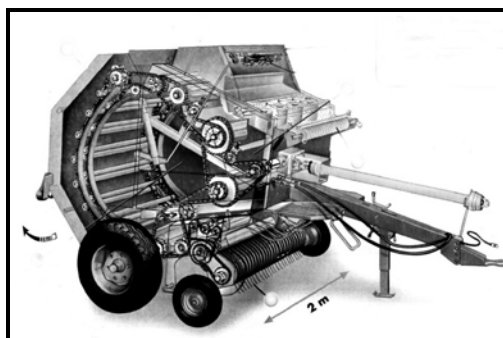
- 5.5.1 Name FIVE factors that need to be considered before buying a new tractor.

(5)

- 5.5.2 Name FOUR factors that need to be considered in terms of drive/torque when tractors are purchased.

(4)

- 5.6 The picture below shows a baler that is used to make round bales on a farm.



- 5.6.1 Name the TWO different baling systems found in round balers.

(2)

- 5.6.2 Tabulate FIVE advantages of the ram/rectangular baler and the round baler.

(10)
[40]

QUESTION 6: WATER MANAGEMENT

- 6.1 Drainage of soil with a low infiltration tempo is of the utmost importance to a crop farmer.



A flooded/waterlogged field

- 6.1.1 Name THREE disadvantages of closed drains. (3)
- 6.1.2 Briefly discuss the construction of a closed drain. (5)
- 6.2 Irrigation pipes are sometimes buried beneath the soil. Describe THREE precautionary measures that should be taken when these pipes are laid. (3)
- 6.3 A septic tank serves as a reservoir where solids accumulate and are gradually broken down by bacterial action.
- 6.3.1 Briefly explain how a septic tank functions. (3)
- 6.3.2 Identify the places where a septic tank should NOT be built. (4)
- 6.3.3 Maintenance of a septic tank is very important. Give reasons for this statement. (3)
- 6.3.4 Name FIVE important measures which users of septic tank systems must keep in mind if they want the system to function properly. (5)
- 6.4 Water scheduling is the process used by irrigation system managers to determine the correct frequency and duration of watering, and the quantity of water applied to crops. Give TWO reasons why irrigation scheduling is necessary. (2)
- 6.5 What is the maximum depth of a well? Motivate your answer. (2)
- [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: